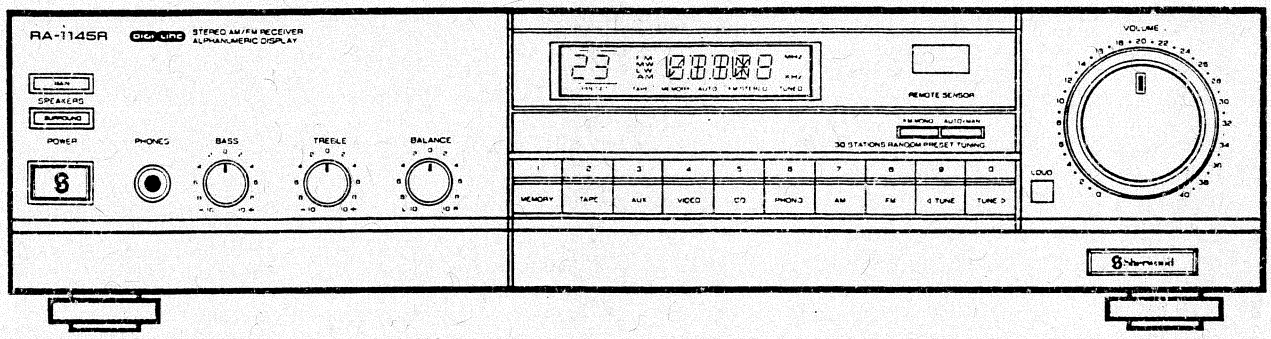
SERVICE MANUAL

RA-1145R

OPTIMUM DIGITAL RECEIVER



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NOTICE

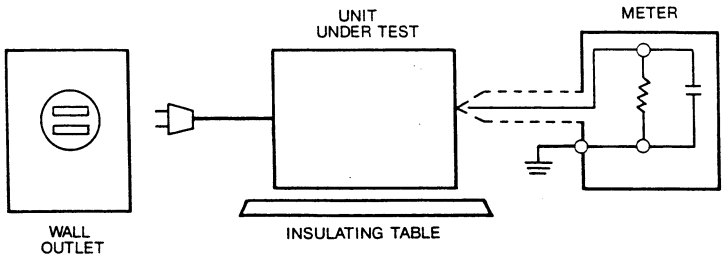
- This manual is for authorized and qualified service personnel, so the basic service procedure and common-sense of safety are not described in this manual.
- Sherwood always makes every endeavor to improve the products, therefore the specifications and data provided are subject to change without notice.

Sherwood

To Service Personnel

1. Critical Components Information.
   The ⚠ marked components on schematic diagram and parts list be replaced with the parts having specifications equal to these originally installed.

2. Leakage Current Measurement (For 120V Version only).
   When the service has been completed, make sure that all exposed conductive surfaces are properly insulated from the power supply circuits.
   - Leakage current meter should have an input impedance of 1500 ohms resistive shunted by 0.15μF capacitor.
   - Leakage current shall not be exceed 0.5mA.



3. Turn the unit OFF, and disconnect the power supply cord during disassembly and replacement of parts.

4. When the service has been completed, be sure to check all protective device and spacings before returning the unit to customer.

5. This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" with in the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock hazard to persons.

6. This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

7. Caution: To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Specification

DIN/IEC Version

Amplifier Section

Power Output, per Channel	
IEC standard: 63Hz to 12.5kHz, 8 ohms THD 0.7%	55W
DIN standard: 1KHz, 8 ohms THD 1%	60W
THD. −6dB Rated Output, 8 ohms, 1kHz	0.015%
IMD. −6dB Rated Output, at 8 ohms 60Hz:7kHz=4:1 SMPTE	0.009%
Damping Factor at 1kHz, 8 ohms	70
Input Sensitivity for 50W output 8 ohms at 1kHz	
Phono	2.5mV
Linear Inputs	150mV
Phono Pre-amp Input Overload at 1kHz, 0.1% THD	170mV
at 10kHz, 0.1% THD	750mV
Signal to Noise Ratio, IEC "A" wtd/unwtd VOL Adj. 50W	
Phono : 5mV input 2.2k ohm shorted,	80/75dB
Linear Inputs : 500mV input, 22k ohm shorted, VOL Adj. 50W	95/90dB
Frequency Response	
Phono, RIAA 30-20,000Hz	±0.5dB
Linear inputs at 1W, −3dB	5Hz—40kHz
Tone Control, BASS at 100Hz, TREBLE at 10kHz	±10dB
Loudness Contour	
at 100Hz	+7dB
at 10kHz	+3.0dB

FM Section

Tuning Range	USA/CANADA/AUSTRALIA Version: 87.5—108MHz
	EUROPE Version:87.50—108.0MHz
Scanning Frequency Interval (Auto/Manual)	USA/CANADA Version: 0.1MHz
	EUROPE/AUSTRALIA Version 0.05MHz
Usable Sensitivity at S/N=26dB, 100% Mod.	1.7μV (9.8dBf)
50 dB Quieting Sensitivity, Stereo	36μV (36.4dBf)
THD at 1kHz, 100% Mod, Mono	0.2%
Stereo	0.3%
Stereo Separation at 1kHz	50dB
Signal to Noise Ratio IHF Mono	75dB
Stereo	70dB
Frequency Response 20-15,000Hz	+0.5/−3dB
Audio Output Voltage, 1kHz 100% Mod	600mV
De-emphasis	USA/CANADA Version: 75μsec
	AUSTRALIA/EUROPE Version: 50μsec

AM Section

Tuning Range	USA/CANADA Version: 520—1710kHz
	AUSTRALIA/EUROPE Version: 522—1611
Scanning Frequency Interval (Auto/Manual)	USA/CANADA Version: 10kHz
	AUSTRALIA/EUROPE Version: 9kHz
Usable Sensitivity IHF at S+N/N=20dB, Loop Antenna	500μV/m
Signal to Noise Ratio, 30% Mod Ref.	40dB
Audio Output Voltage, 400Hz, 30% Mod	150mV

IHF/EIA Version

Amplifier Section

Power Output per Channel continuous RMS with no more than 0.08% THD	
at 8 ohms, 20-20,000Hz	50W
at 8 ohms, 1kHz	55W
Inter Modulation Distortion, 60Hz:7kHz=4:1 SMPTE	
50W output into 8 ohms	0.08%
Damping Factor at 1kHz, 8 ohms	70
Input Sensitivity for 50W output 8 ohms at 1kHz	
Phono	2.5mV
Linear Inputs	150mV
Phono Pre-amp Input Overload at 1kHz, 0.1% THD	170mV
at 10kHz, 0.1% THD	750mV
Signal to Noise Ratio, IHF "A" wtd/unwtd	
Phono	±0.5dB
Linear Inputs	92/85dB
Frequency Response	
Phono, RIAA 30-20,000 Hz	±0.5dB
Linear Inputs at 1W, −3dB	5Hz—40kHz
Tone Control, BASS at 100Hz, TREBLE at 10kHz	±10dB
Loudness Contour	
at 100Hz	+7dB
at 10kHz	+3.0dB
Channel Separation at AUX input shorted	
100Hz	60dB
1kHz	60dB
10kHz	50dB

FM Section

Tuning Range	USA/CANADA/AUSTRALIA Version: 87.5—108MHz
	EUROPE Version: 87.5—108.0MHz
Scanning Frequency Interval (Auto/Manual)	USA/CANADA Version: 0.1MHz
	EUROPE/AUSTRALIA Version: 0.05MHz
Usable Sensitivity IHF at S+N+D/N=30dB	1.7μV (9.8dBf)
50dB Quieting Sensitivity, Stereo	36μV (36.4dBf)
THD at 1 kHz, 40 kHz Dev, Mono	0.15%
Stereo	0.25%
Stereo Separation at 1kHz	50dB
Signal to Noise Ratio IHF, Mono	75dB
Stereo	70dB
Frequency Response 20-15,000Hz	+0.5/−3dB
Audio Output Voltage, 1kHz 100% Mod	600mV
De-emphasis	USA/CANADA Version: 75μsec
	AUSTRALIA/EUROPE Version: 50μsec

AM Section

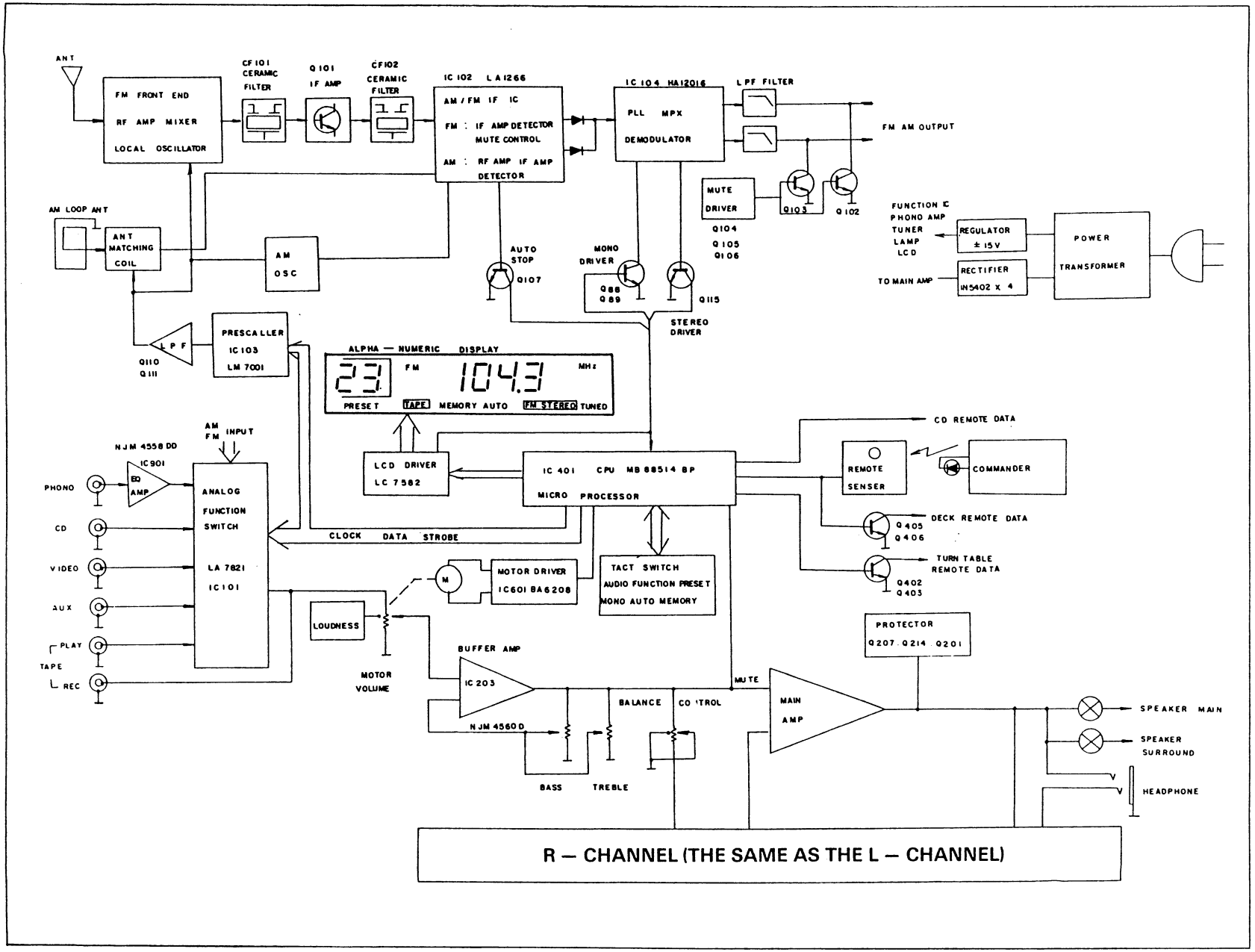
Tuning Range	USA/CANADA Version: 520—1710kHz
	AUSTRALIA/EUROPE Version: 522—1611kHz
Scanning Frequency Interval (Auto/Manual)	USA/CANADA Version: 10kHz
	AUSTRALIA/EUROPE Version: 9kHz
Usable Sensitivity IHF at S+N/N=20dB, Loop Antenna	500μV/m
Signal to Noise Ratio, 30% Mod Ref.	40dB
Audio Output Voltage, 400Hz 30% Mod	150mV

General

Power Requirement	
DIN/IEC Version	150W (Min 20W, Max 240W)
IHF/EIA Version	150W (Min 20W, Max 240W)
Dimensions	(W)440×(H)100×(D)280mm (W)17.3″×(H)3.9″×(D)11.0″
Power Consumption:	
A: USA & CANADIAN MODEL	120V AC, 60Hz
B: MULTI-VOLTAGE MODEL	120V/220V AC, 60/50Hz
C: GENERAL EUROPEAN MODEL	220V AC, 50Hz
D: WEST GERMAN & ITALIAN MODEL	220V AC, 50Hz
E: BRITISH & AUSTRALIAN MODEL	240V AC, 50Hz
F: SWISS & SCANDINABIAN MODEL	220V AC, 50Hz
Weight (Net)	6kg (13.2lbs)

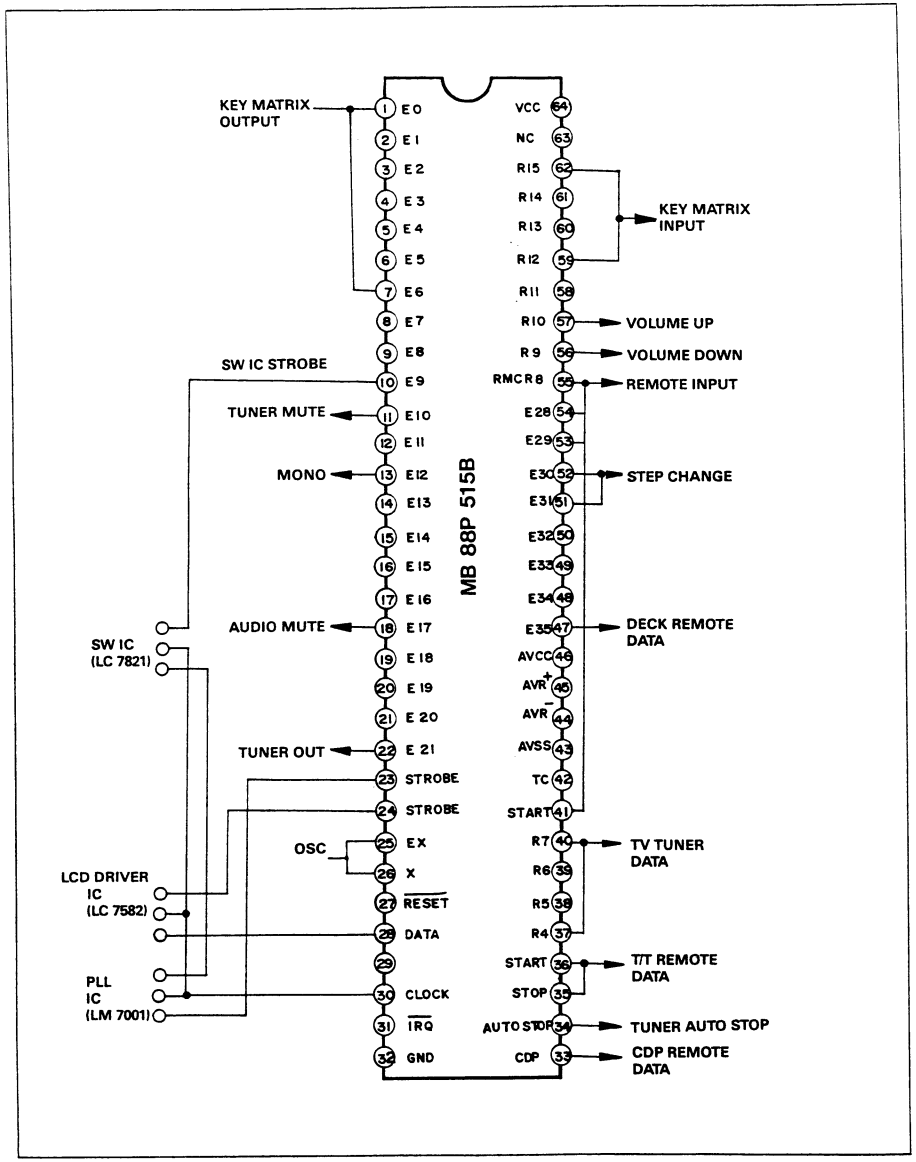
NOTE: Specifications and design subject to change without notice for improvements.

Block Diagram



Circuit Description

Pin Assignment:IC401

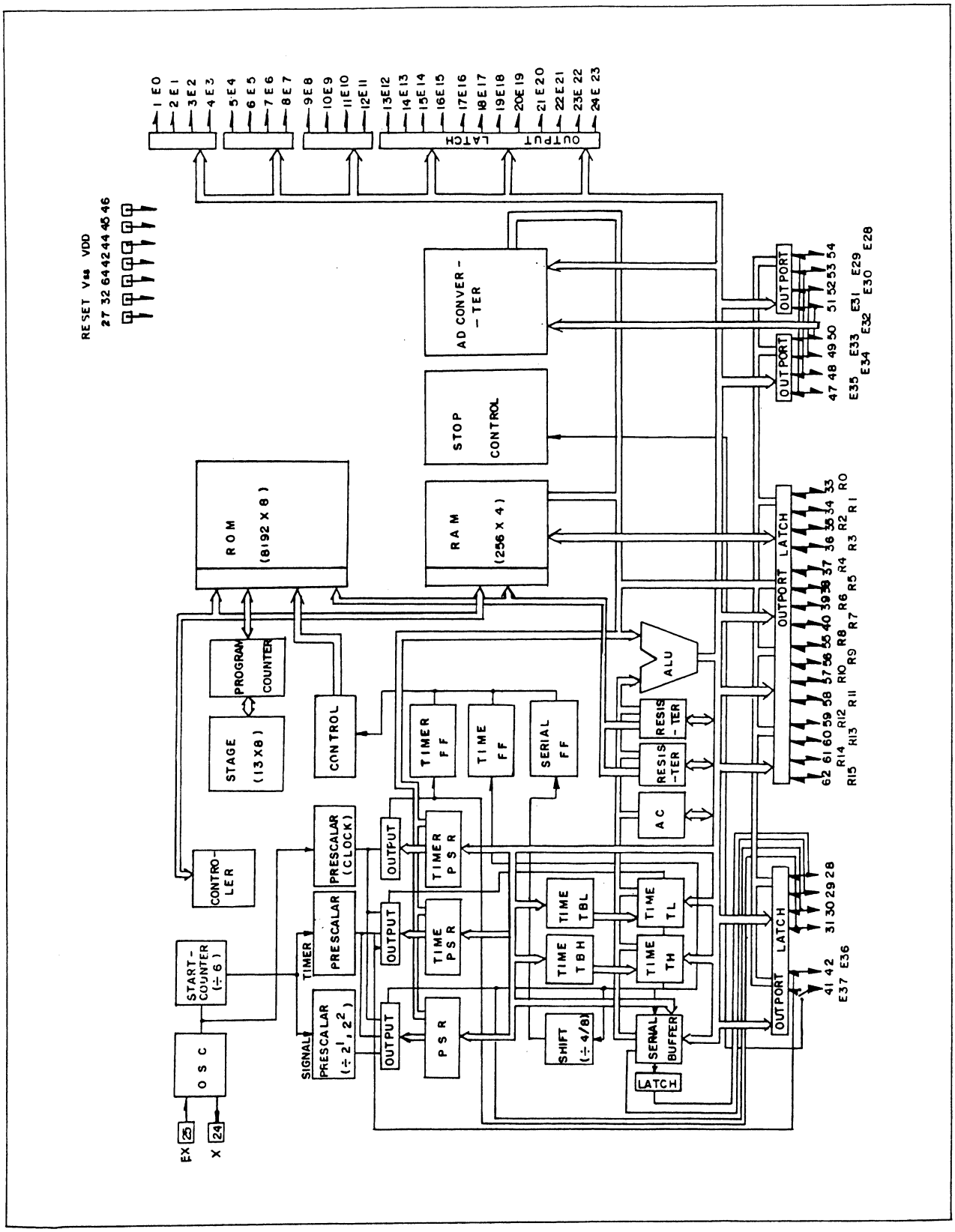


Functions Assignment:IC401

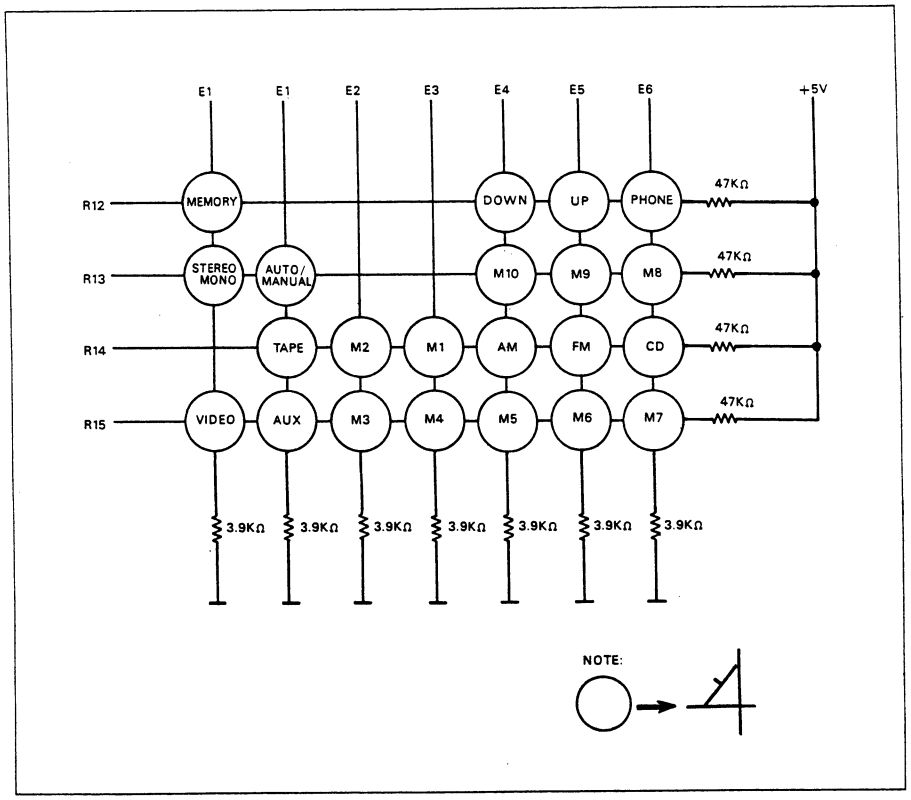
No	Terminal	Operating Chart	Remarks
1	KEY MATRIX OUTPUT		
2	KEY MATRIX OUTPUT		
3	KEY MATRIX OUTPUT		
4	KEY MATRIX OUTPUT		
5	KEY MATRIX OUTPUT		
6	KEY MATRIX OUTPUT		
7	KEY MATRIX OUTPUT		
8			
9			
10	SW IC STROBE		LC 7821
11	TUNER MUTE	5V / 0V	Q106
12			
13	FM MONO	5V / 0V	IC104
14			
15			
16			
17			
18	AUDIO MUTE	5V / 0V	Q204
19			
20			
21			
22	TUNER OUT	5V / 0V	Q109
23	PLL STROBE	1.6m/sec, 5V / 0V, 30.6ms	LM7001
24	LCD STROBE		LC7582
25	EX		
26	X	6MHz	
27	$\overline{\text{RESET}}$		
28	DATA		LM7001 LC7821
29			
30	CLOCK		LC 7582
31	$\overline{\text{IRQ}}$		
32	GND		

No	Terminal	Operating Chart	Remarks
33	CDP REMOTE		
34	AUTO STOP	5V / 0V	Q107
35	T/T STOP	5V / 0V	Q402
36	T/T START	5V / 0V	Q403
37	TV TUNER REMOTE DATA		
38	TV TUNER REMOTE DATA		
39	TV TUNER REMOTE DATA		
40	TV TUNER REMOTE DATA		
41	START	REMOTE INPUT	Q404
42			
43			
44			
45			
46			
47	DECK REMOTE DATA	REMOTE INPUT	Q405B/Q406B
48			
49			
50		FM/AM	
51	STEP CHANGE	100KHz/10KHz	2.2KΩ
52	STEP CHANGE	50KHz/9KHz	100KΩ 5V
53			
54			
55	RMC	REMOTE INPUT	
56	VOLUME DOWN	5V / 0V	BA 6208
57	VOLUME UP	5V / 0V	BA 6208
58			
59	KEY MATRIX INPUT	0V 5V	
60	KEY MATRIX INPUT		
61	KEY MATRIX INPUT		
62	KEY MATRIX INPUT		
63			
64	Vcc	+5V	

Internal Block Diagram:IC401

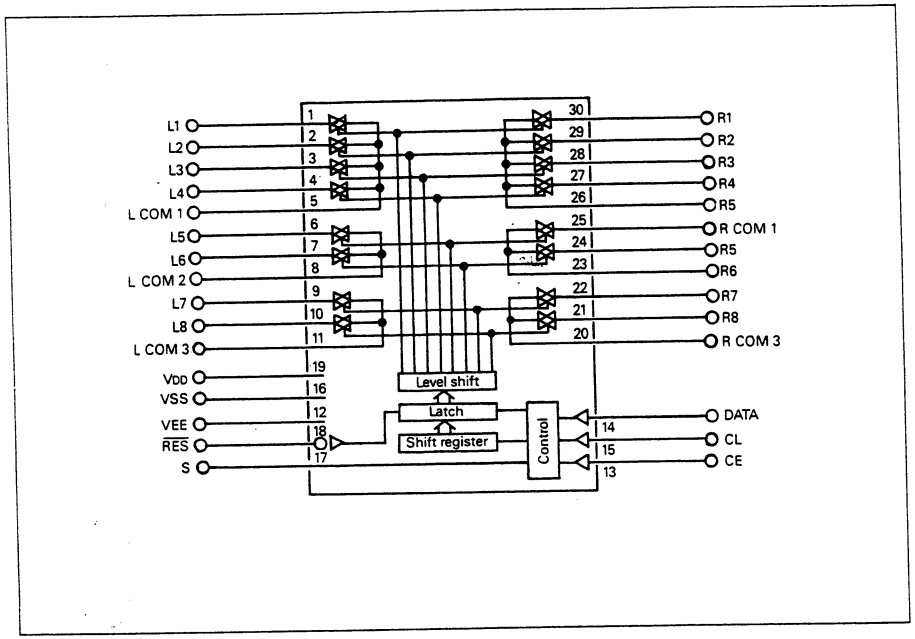


Key Matrix of Input & Output



IC Lead Identification

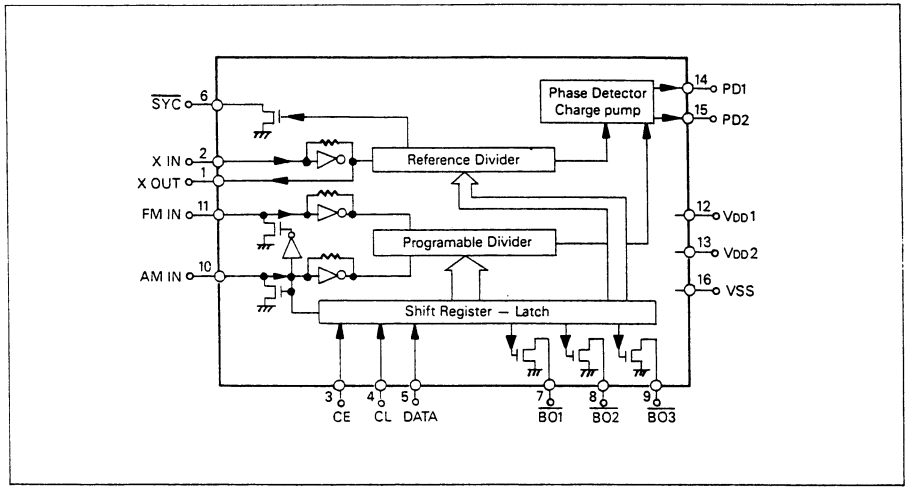
LC 7821:IC101



Pin No.	Terminal	Description
1	Tuner	Input/output terminals of audio signal of left channel
2	Phono	
3	CD	
4	Video	
5		Control to the inside analog switch at the serial data
6	AUX	
7		
8	Tape Output	
9		
10	Tape Input	
11	Source Output	
12	VEE	Negative power supply terminal (−15V)
13	Strobe	Serial Control terminal Connect terminal of MB 88P 515B
14	Data	
15	Clock	
16	VSS	Ground terminal
17	S	

Pin No.	Terminal	Description
18	$\overline{RES}$	Reset terminal When power is turned ON the Condition of the analog switch is not determined but when this terminal is 'L', all analog switches are OFF.
19	VDD	Power Supply terminal (+15V)
20	Source Output	Input/Output terminals of audio signal of right channel Control to the inside analog switch at the serial data
21	Tape Input	
22		
23	Tape Output	
24		
25	AUX	
26		
27	Video	
28	CD	
29	Phono	
30	Tuner	

LM7001:IC103



Pin No.	Terminal	Description
1	X OUT	Connect to the 7.2MHz crystal oscillator
2	X IN	
3	CE	Chip enable terminal. Connect to the PLL terminal of IC401
4	CL	Serial clock input terminal Connect to the CLOCK terminal of IC401
5	DATA	Serial data input terminal Connect to the DATA terminal of IC 401
6	SYN	Not used.
7	BAND 1	BAND selector output terminal.
8	BAND 2	BAND / BAND1 / BAND2 FM / H / L FM A / L / H
9	ANT	Antenna Selector output terminal. "H" when antenna A and AM.
10	AMIN	AM local oscillator input terminal.
11	FMIN	FM local oscillator terminal.
12	VDD1	Power supply terminal for back-up.
13	VDD2	Power supply terminal.
14	PD1	Charge out of the phase detector which constitutes the PLL. High level is output when the divided local oscillator frequency is high than the reference frequency.
15	VD2	In the opposite case, low level is output. Floating occurs when the frequency matched The output is applied to the variable capacitor diode in the local oscillator through the low pass filters.
16	Vss	Ground terminal.

Electrical Adjustment Procedure

***Before making adjustment, operate the appliance for more than 2 minutes.**

• TUNER SECTION

* Note: 1. 0 dB=1μV 2. FM 100% Mod.=75 kHz Dev. 3. DVM=Digital Volt Meter
4. SG=Signal Generator 5. SSG=Stereo Signal Generator

1. MW Adjustment

- Selector; TUNER, MW/AM
- In case of 2 band appliance(AM/FM), MW is converted into AM.

No.	Subject	Feed Signal From	Feed Signal To	Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
1.	Tuning Voltage	520kHz		*1) 520kHz	Connect DVM	T104	DC 1±0.4V	
		1710kHz		*2) 1710kHz	Same as above	T102	DC 8.5±0.4V	
		• Repeat the step *1) and *2) until DVM reads the tuning voltage mentioned above. • In case the freq.is 9kHz, the freq.of AM SG and appliance should be changed to *1) 522 kHz *2)1611 kHz						
2.	IF	AM IF Genescope	ANT.		Connect IF Genescope	T106	Symmetrical curve on AM IF Genescope	
3.	RF Tuning	*1) AM SG 600kHz, 75 dB 400Hz(30% MOD.)	ANT.	600kHz	Output Connect AC Voltmeter & Oscilloscope	T105	Maximize audio output	AM SG / TEST LOOP ANT / 60cm / APPLIANCE
		*2) AM SG 1400kHz, 75 dB 400Hz(30% MOD.)	ANT.	1400kHz	Same as above	T101	Same as above	
		• Feed Signal should be fed to Loop ANT.through the TEST Loop ant., 60cm distant from the appliance • Repeat the step *1) & *2) until no further improvement occurs. • In case the freq. is 9kHz, the freq. of AM SG and appliance should be changed to *1) 603 kHz *2)1404 kHz						
4.	Tuned Level	AM SG 1000kHz, 83 dB 400Hz(30% MOD.)	ANT.	1000kHz		VR101		Tuned light on LCD
		• In case the freq. step is 9kHz, the freq. of AM SG and appliance should be changed to 999kHz.						

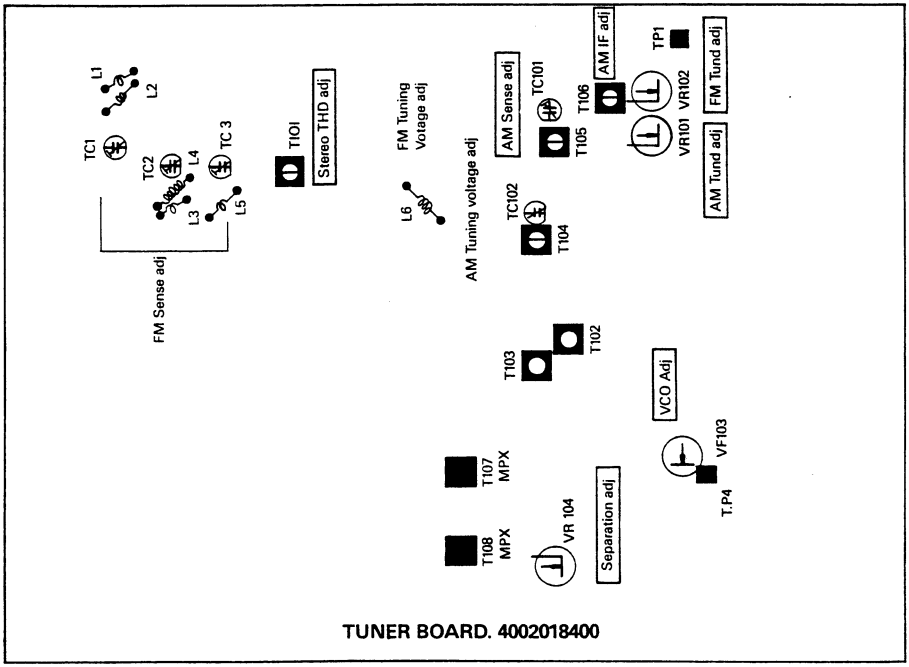
2. FM Adjustment

- Selector; TUNER, FM (Mono/Stereo)
- Daviation; USA/CANADA (75 kHz Dev.)
  EUROPE(40 kHz Dev.)

No.	Subject	Feed Signal From	Feed Signal To	Setting Appliance	Measure Output	Adjust Point	Adjust For	Remark
1.	Tuning Voltage			108 MHz	Connect DVM		DC 8.3±0.2V	Fixed
				87.5 MHz			DC 2±0.2V	
2.	IF	FM IF Genescope	ANT.	98MHz 66 dB	Connect IF Genescope	T102	Symmetrical S curve on AM IF Genescope	
					Connect DVM		DC 0±50mV	
				Detune	Connect Oscilloscope	T102	Maximize noise output	In case IF Genescope is not available
					Connect DVM		DC 0±50 mV	
3.	RF	*1) FM SG 90 MHz, 2.5μV 1kHz (75 kHz Dev.)	ANT.	90 MHz MONO	Connect AC Voltmeter, Distortion Analyzer and Oscilloscope	L2 L2 L3 L4	Maximize audio output	L5 is D Version
		*2) FM SG 106MHz, 2.5μV 1kHz (75 kHz Dev.)	ANT.	106 MHz MONO	Same as above	TC2	Same as above	TC3 is D Version
		• Repeat the step *1) and *2) until no further improvement occurs.						
4.	THD (Mono)	FM SG 98MHz, 60 dB 1kHz (75kHz dev.)	ANT.	98 MHz MONO	*1) Connect DVM	T102	DC 0±0.1V	
					*2) Connect AC Voltmeter & Distortion Analyzer	T103	Minimize distortion	
		• Adjust the step *1) 1st and the step *2) next and repeat until no further improvement occurs.						
5.	MPX (VCO)	FM SSG 98 MHz, 60 dB 1kHz (75kHz Dev.) Pilot 19kHz (9% Mod.)	ANT.	98MHz Stereo	TP4 Connect freq. Counter	VR103	Read 76kHz	
		• Before adjustment, set the FM SSG to "Mod. OFF".						
6.	THD (Stereo)	FM SSG 98 MHz, 60 dB 1kHz (75kHz Dev.) Pilot 19kHz (9% Mod.)	ANT.	98MHz Stereo	Output connect AC voltmeter & distortion	T101	Minimize distortion	

No.	Subject	Feed Signal		Setting Appliance	Measure Output	Adujst Point	Adujst For	Remark
		From	To					
7.	Mute Level	FM SG 98MHz, 10μV 1kHz (75kHz Dev.)	ANT	98MHz Stereo	Output connect oscilloscope	VR102	Muting occurs marginally	
8.	Sepa-ration	*1) FM SSG 98MHz, 60 dB 1kHz (75kHz, Dev) Pilot 19kHz (9% Mod) (Lch → Rch)	ANT	98MHz Stereo	Rch Mod connect AC voltmeter & distortion analyzer and oscilloscope	VR104	Minimize Output	
		*2) Same as above (Rch → Lch)			Lch Mod connect same as above	VR104	Minimize output	
		• Repeat the step *1) and *2) until no further improvement occurs.						

Adjustment Point

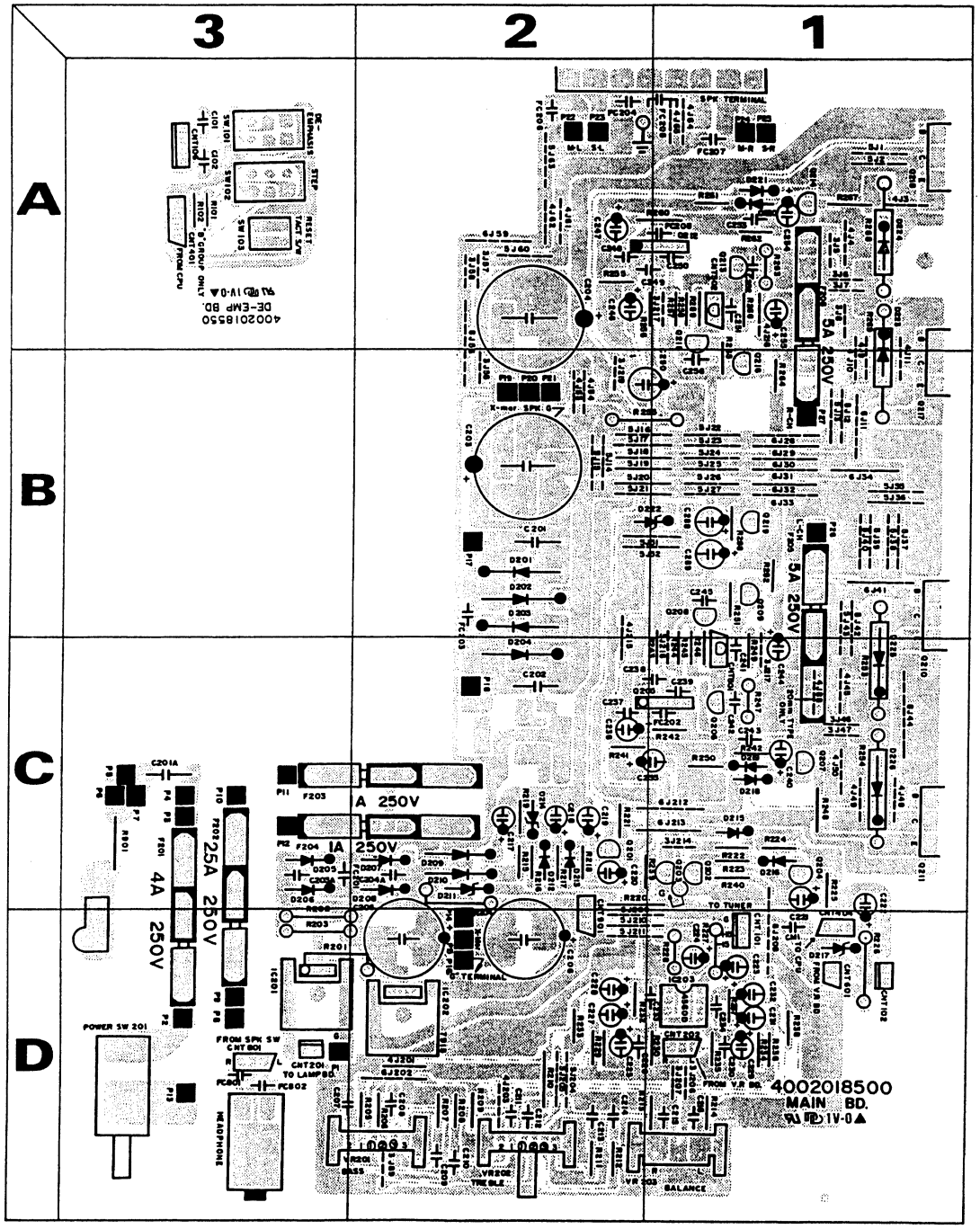


TUNER BOARD. 4002018400

Top & Bottom View of P.C Boards

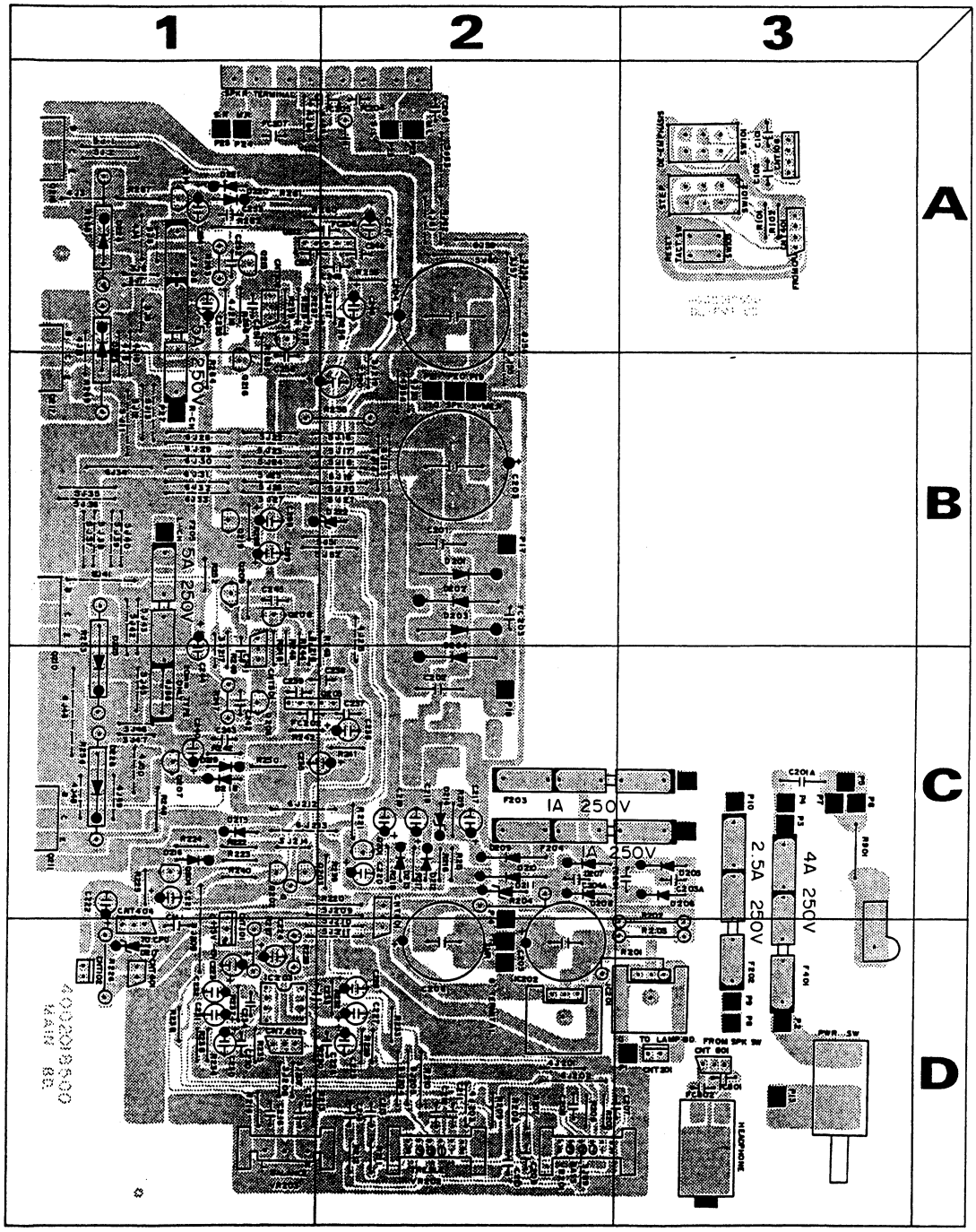
MAIN BOARD 4002018500

(TOP VIEW)



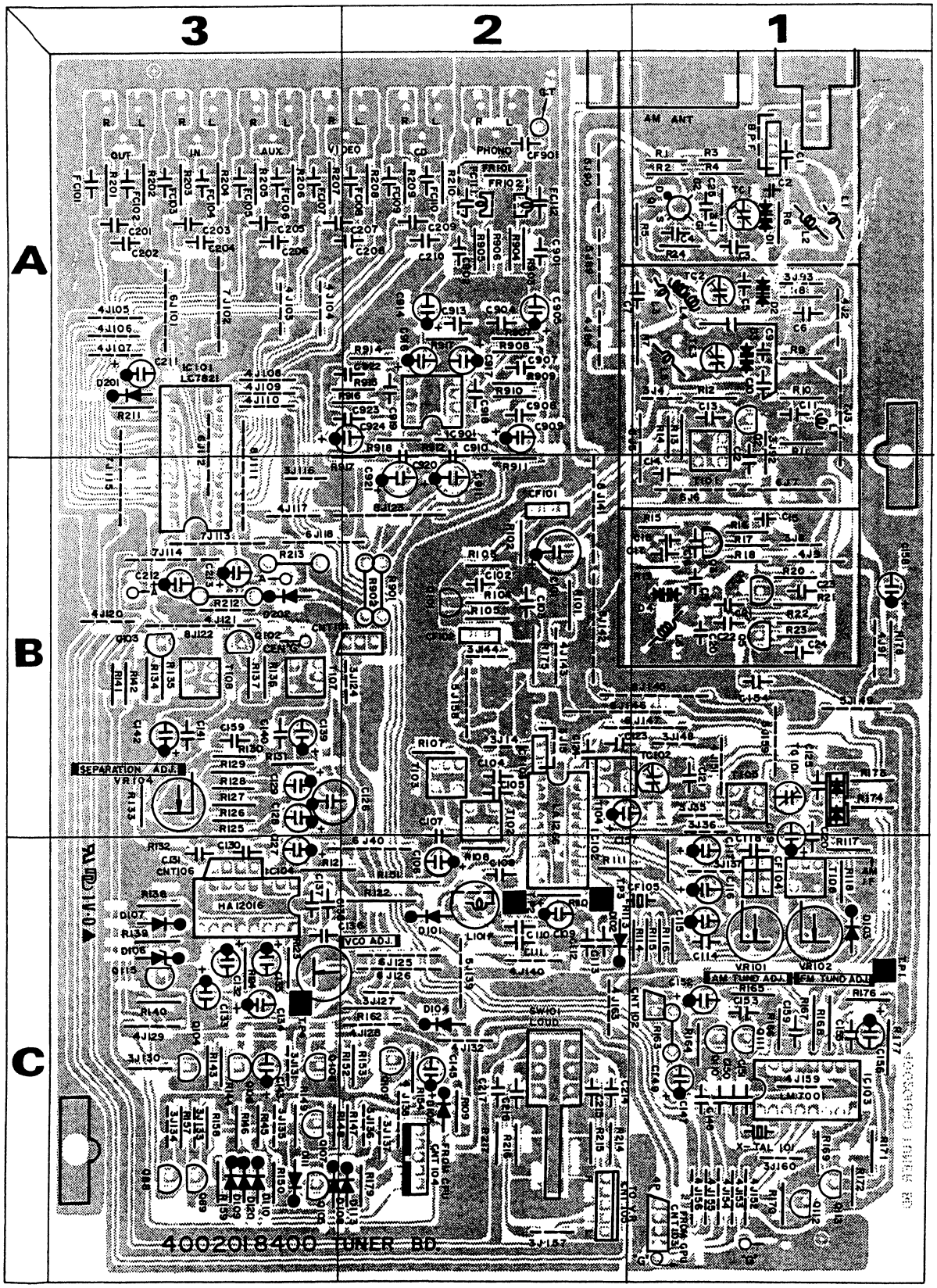
MAIN BOARD 4002018500

(BOTTOM VIEW)



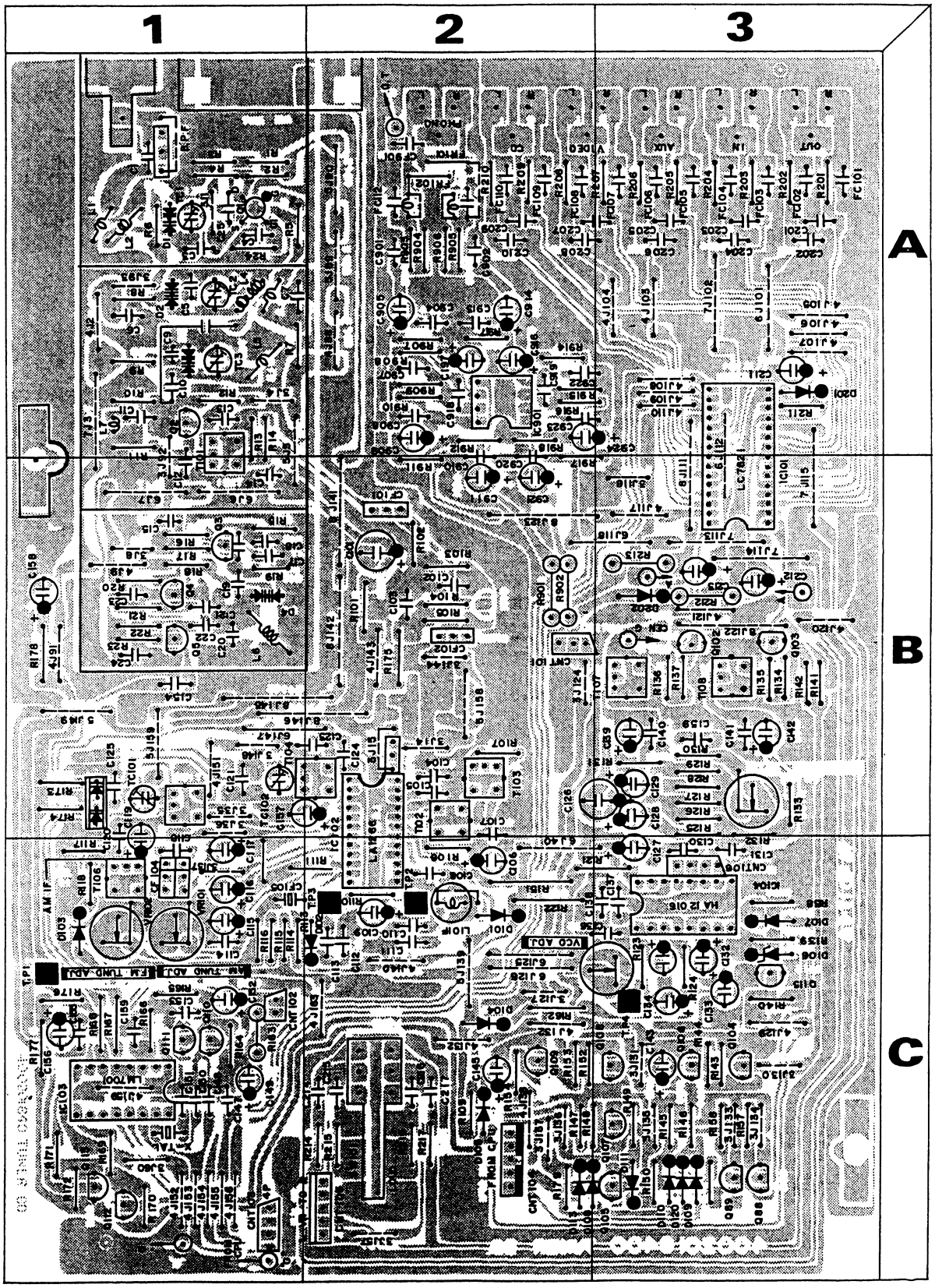
TUNER BOARD 4002018400

(TOP VIEW)



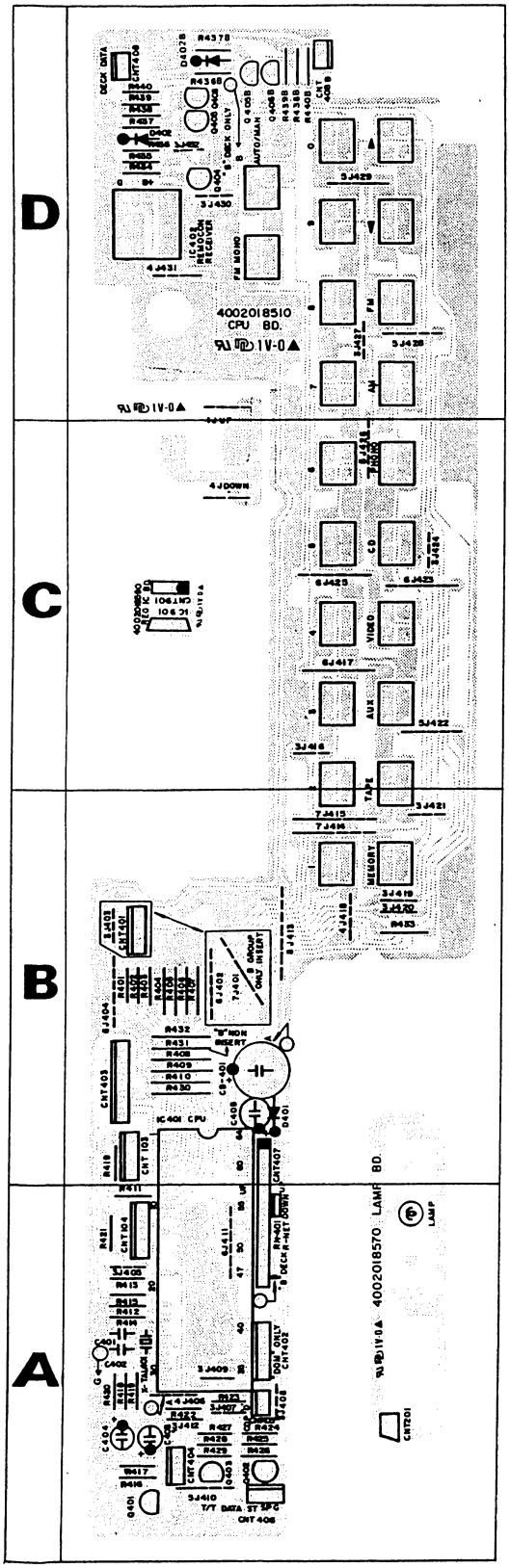
TUNER BOARD 4002018400

(BOTTOM VIEW)

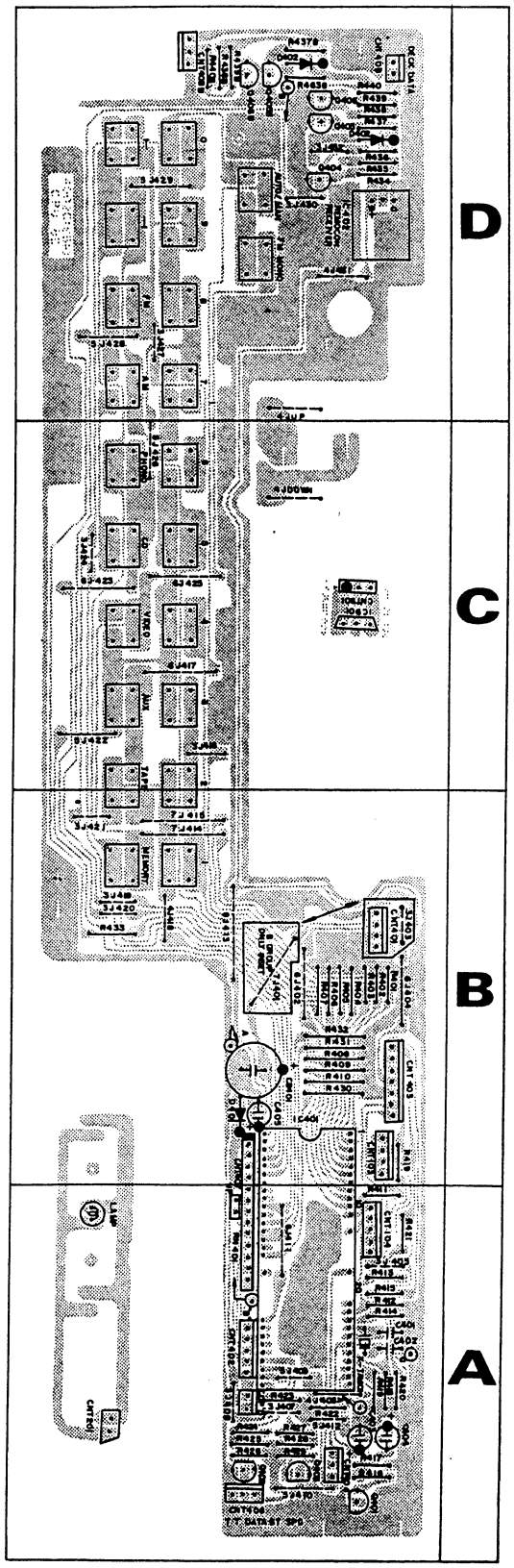


CPU BOARD 4002018510

(TOP VIEW)

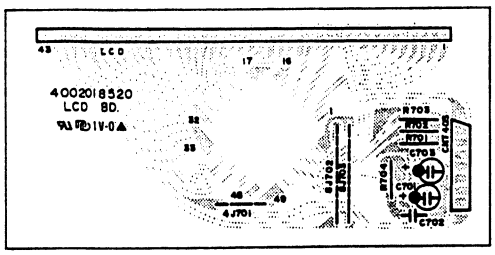


(BOTTOM VIEW)

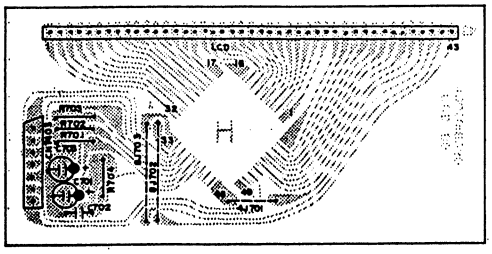


LCD BOARD 4002018520

(TOP VIEW)

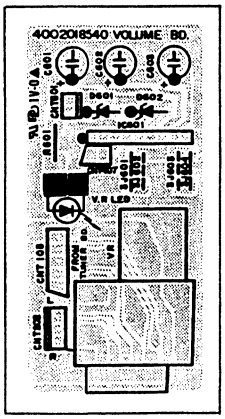


(BOTTOM VIEW)

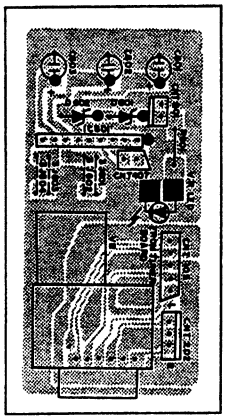


VOLUME BOARD 4002018520

(TOP VIEW)

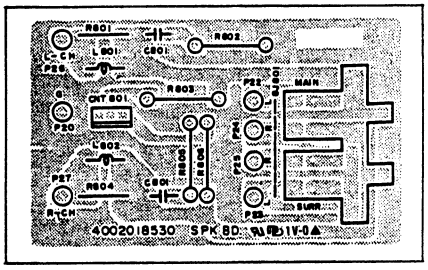


(BOTTOM VIEW)

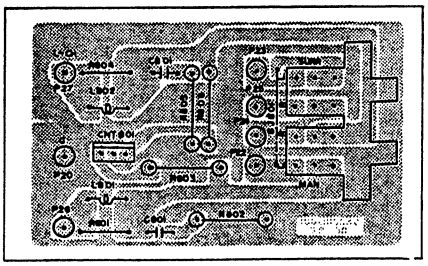


SPEAKER BOARD 4002018530

(TOP VIEW)

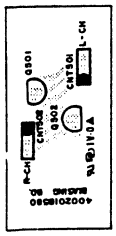


(BOTTOM VIEW)

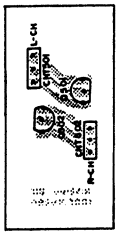


BIASING BOARD 4002018580

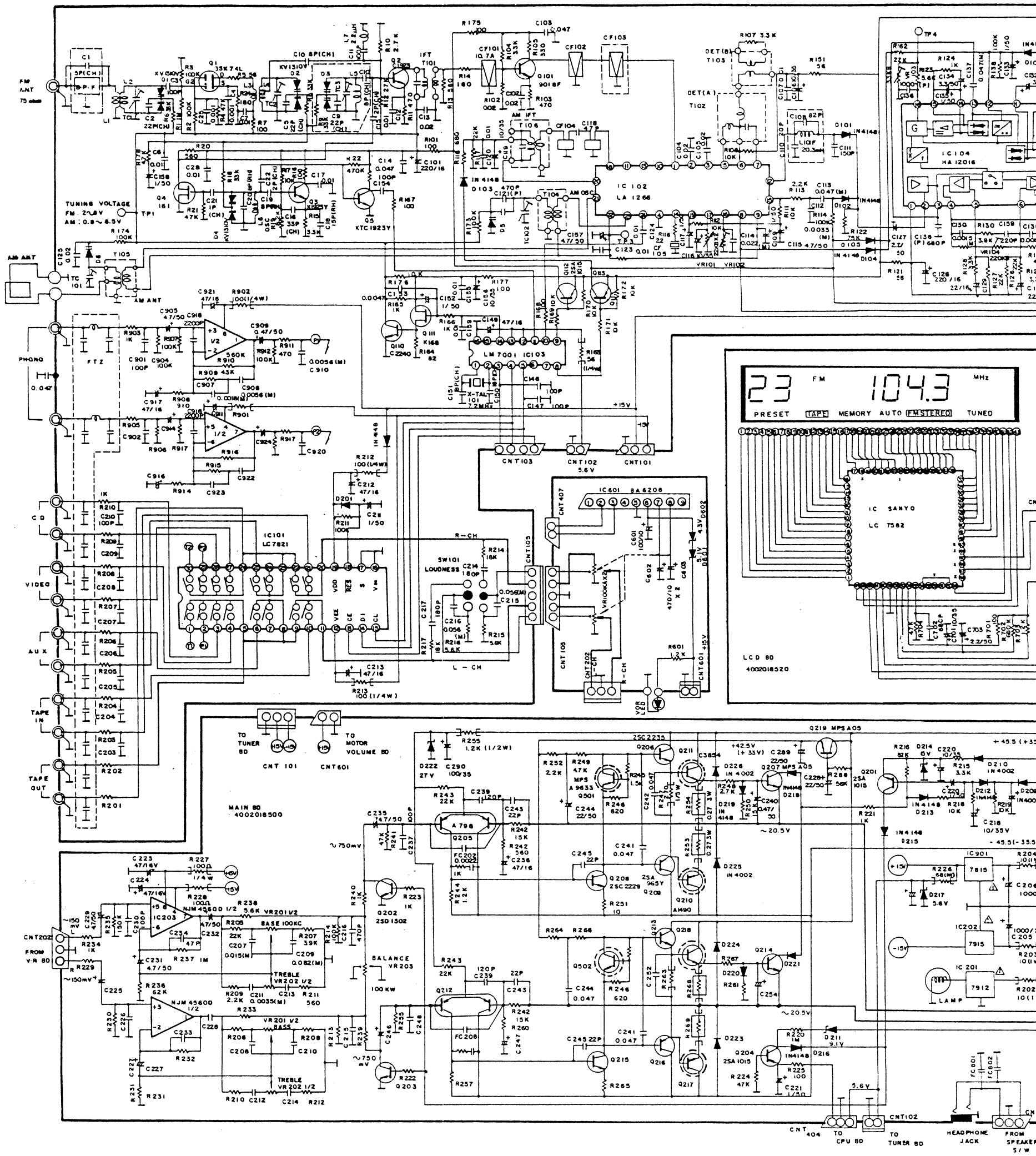
(TOP VIEW)



(BOTTOM VIEW)



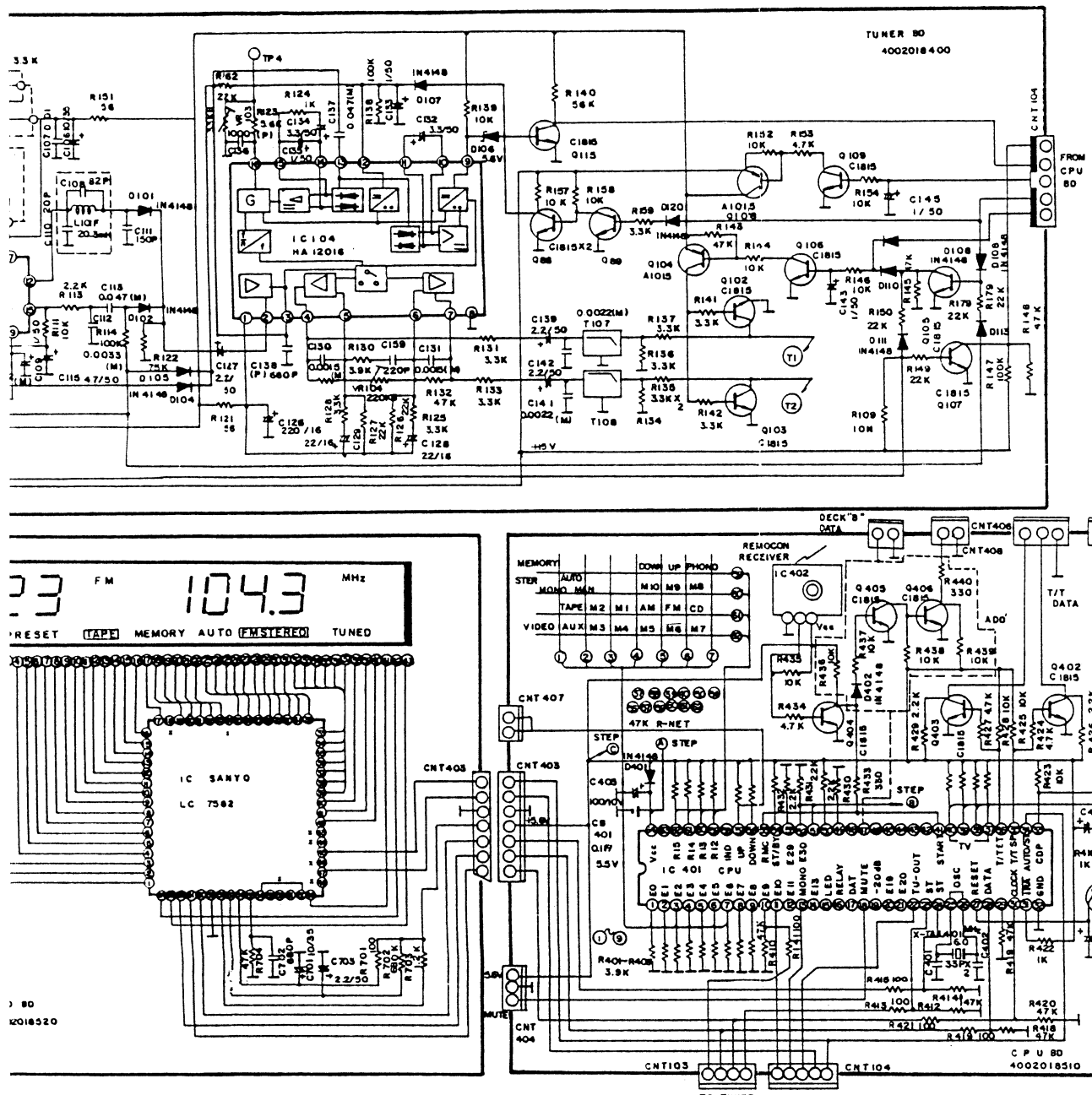
Schematic Diagram
RA-1145R

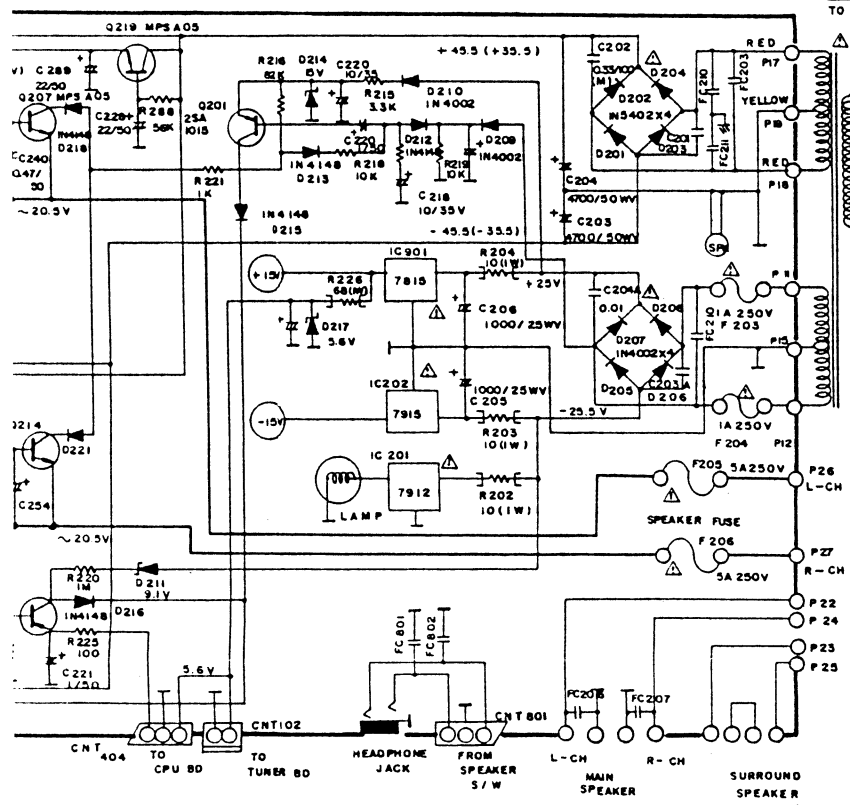


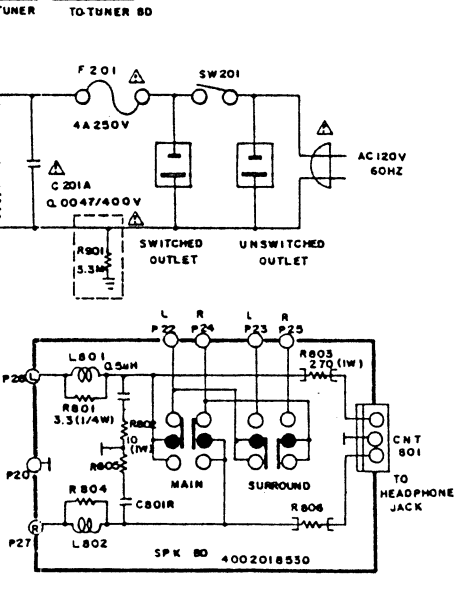
D E F G

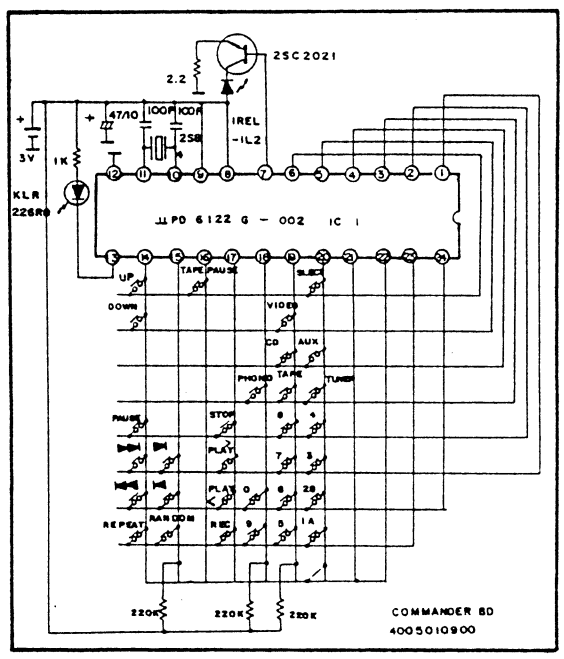
Schematic Diagram

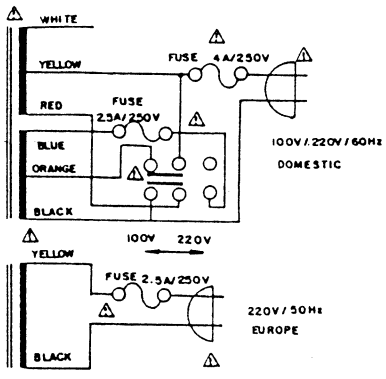
RA-1145R

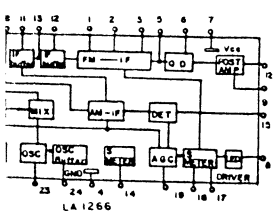


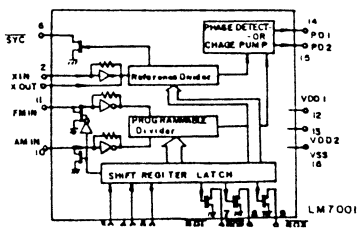












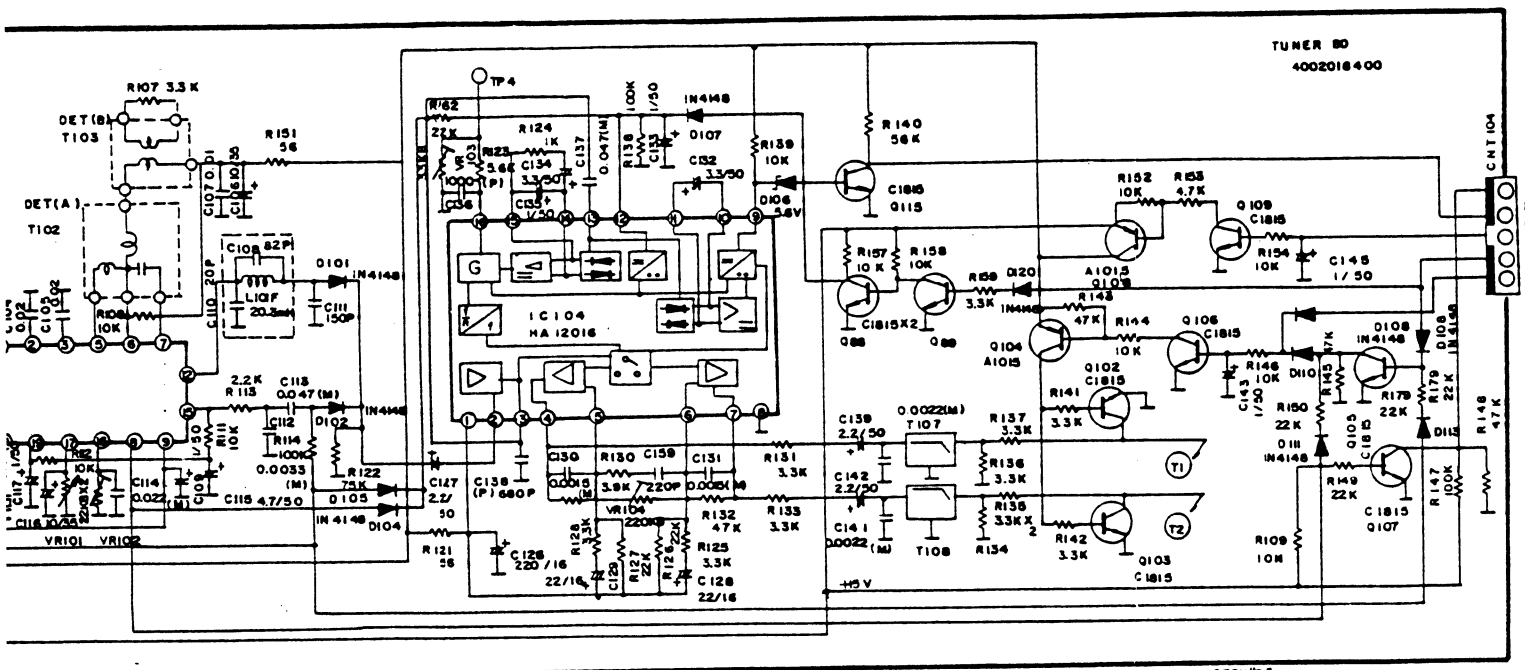
SERVICE INFORMATION

1. RESISTANCE VALUES ARE INDICATED IN OHMS UNLESS OTHERWISE SPECIFIED. (K=1000, M=1000000)
2. CAPACITANCE VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE SPECIFIED. (P=MICRO-MICROFARAD)
3. ALL VOLTAGES ARE MEASURED WITH GROUND DC; VALUE WITH NO SIGNAL
   AC R M S (AT 1KHz 75KHz DEVIATION)
4. THE ⏦ MARKED RESISTORS ARE MOUNTED ABOVE THE P.C.B ON SLEEVES.
5. PRECAUTION
   A) ALL COVERS, SHIELDS AND INSULATING SPACERS MUST BE REPLACED BEFORE RETURNING APPLIANCE TO CUSTOMER.
   B) A DAMAGED POWER SUPPLY CORD MUST BE REPLACED BEFORE RETURNING APPLIANCE TO CUSTOMER.
   C) DIELECTRIC TEST SHOULD BE DONE BEFORE RETURNING APPLIANCE TO CUSTOMER.
   D) SINCE THOSE PARTS MARKED WITH △ ARE CRITICAL PARTS FOR SAFETY. USE THE ONE DESCRIBED IN PARTS LIST.

D E F G

Schematic Diagram

RA-1145R



SERVICE INFORMATION

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   DC: VALUE WITH NO SIGNAL
   AC: R M S (AT 1KHz 75KHz DEVIATION)
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   C) DIELECTRIC TEST SHOULD BE DONE BEFORE RETURNING APPLIANCE TO CUSTOMER.
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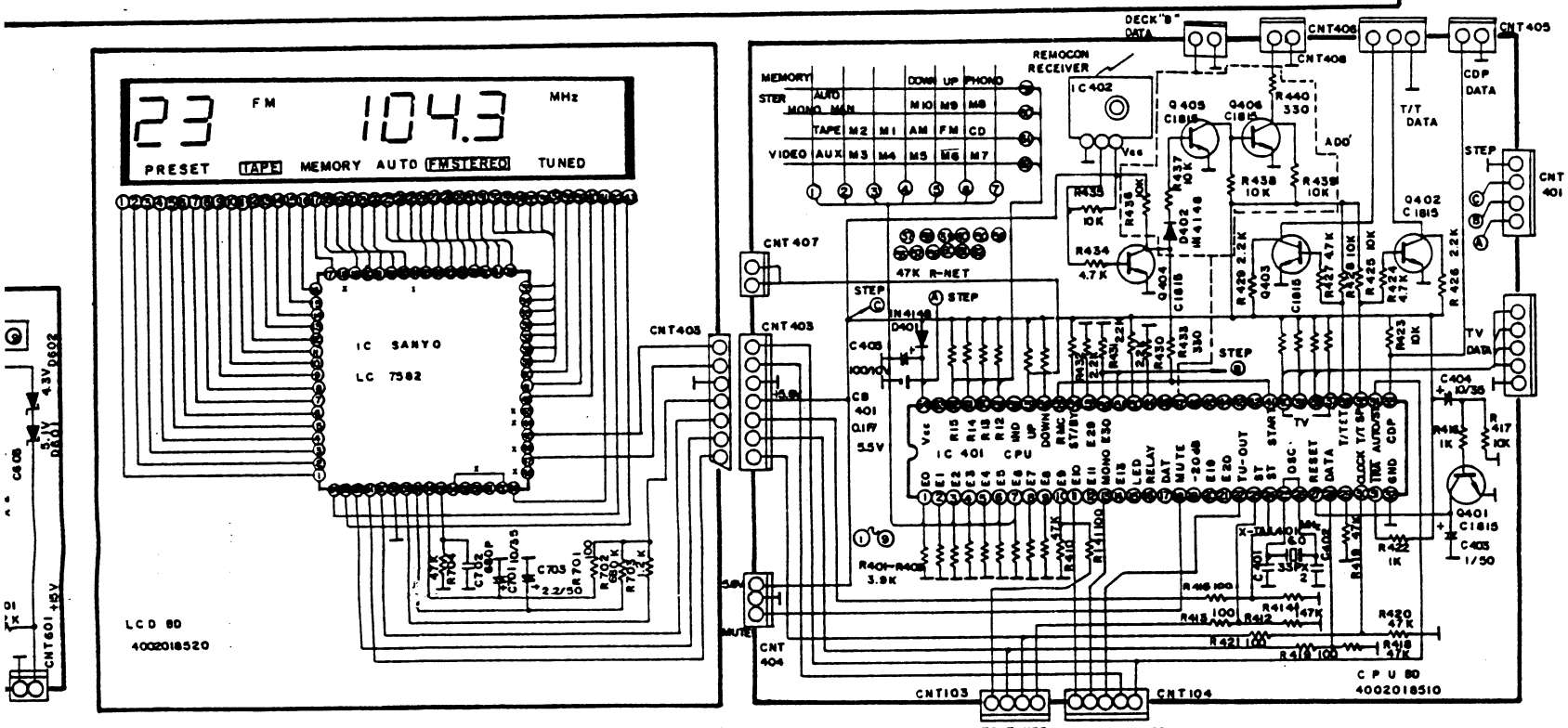
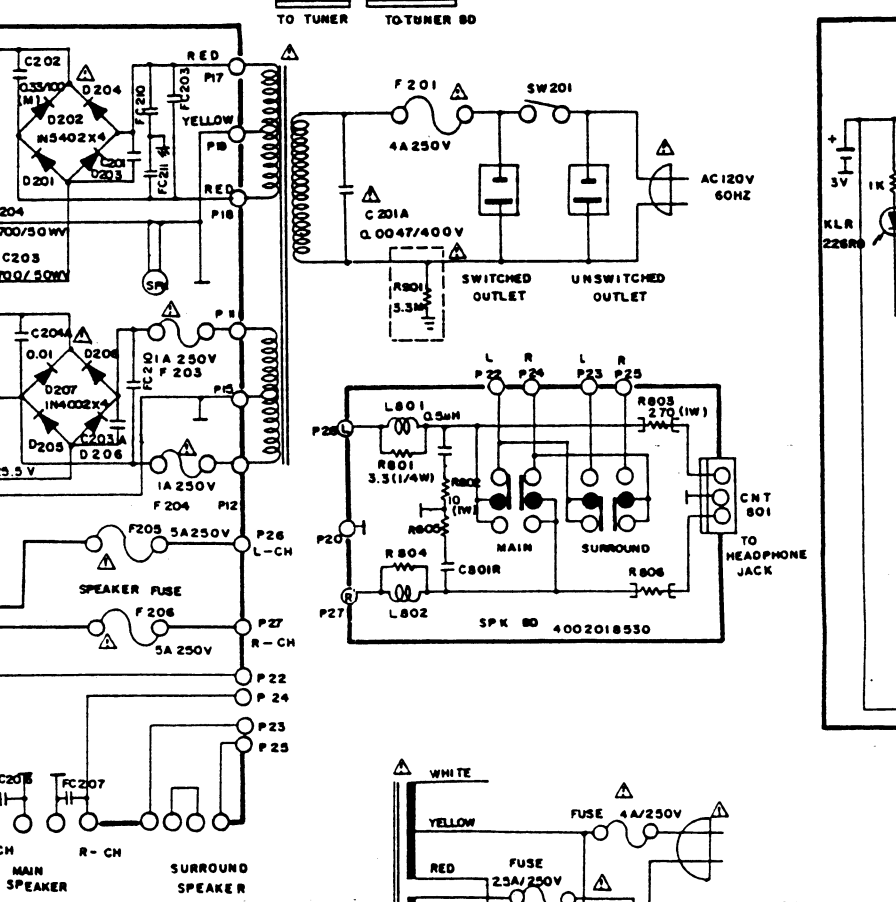
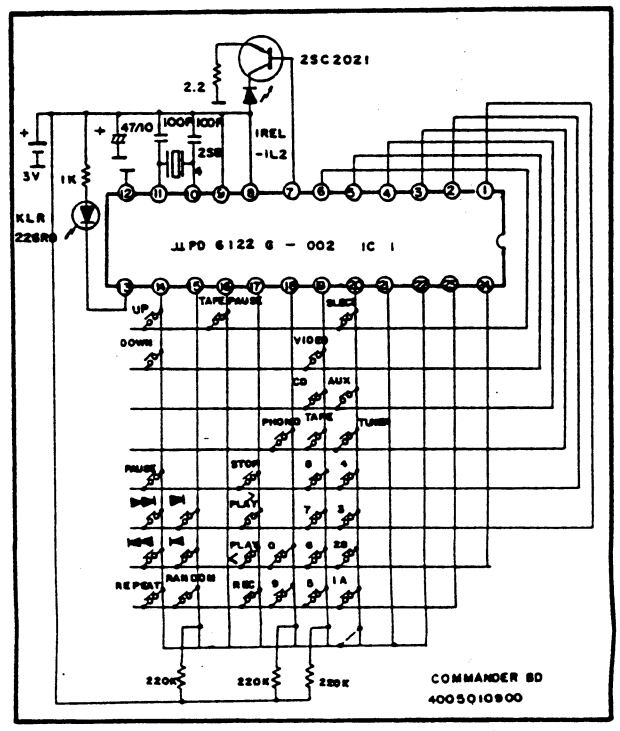
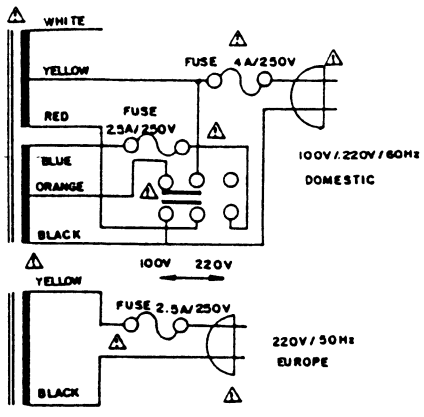
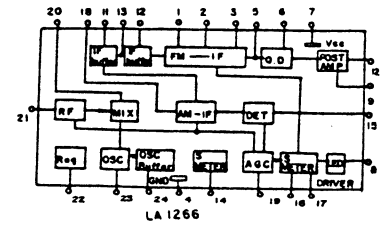
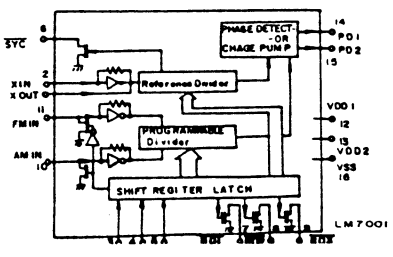




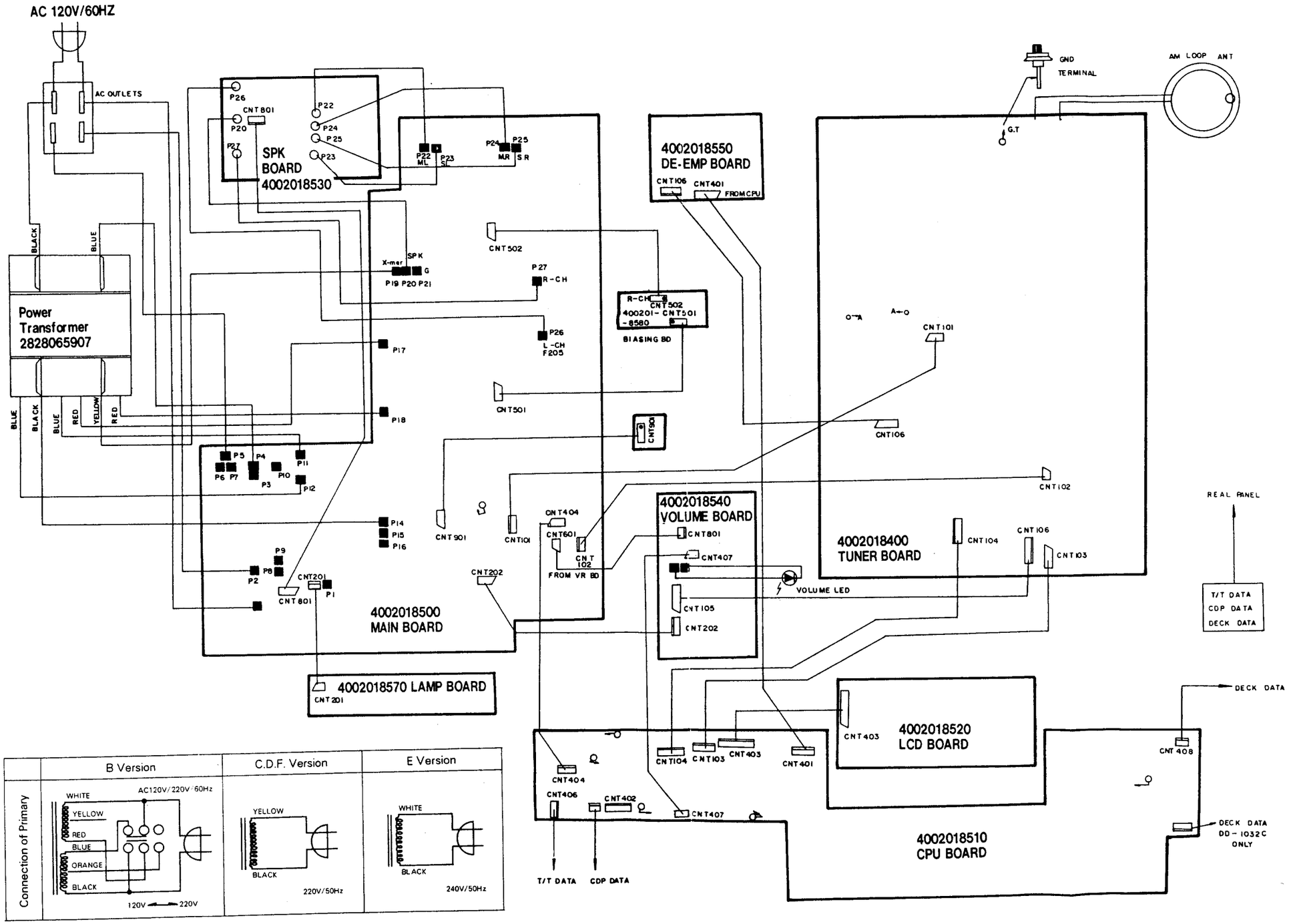






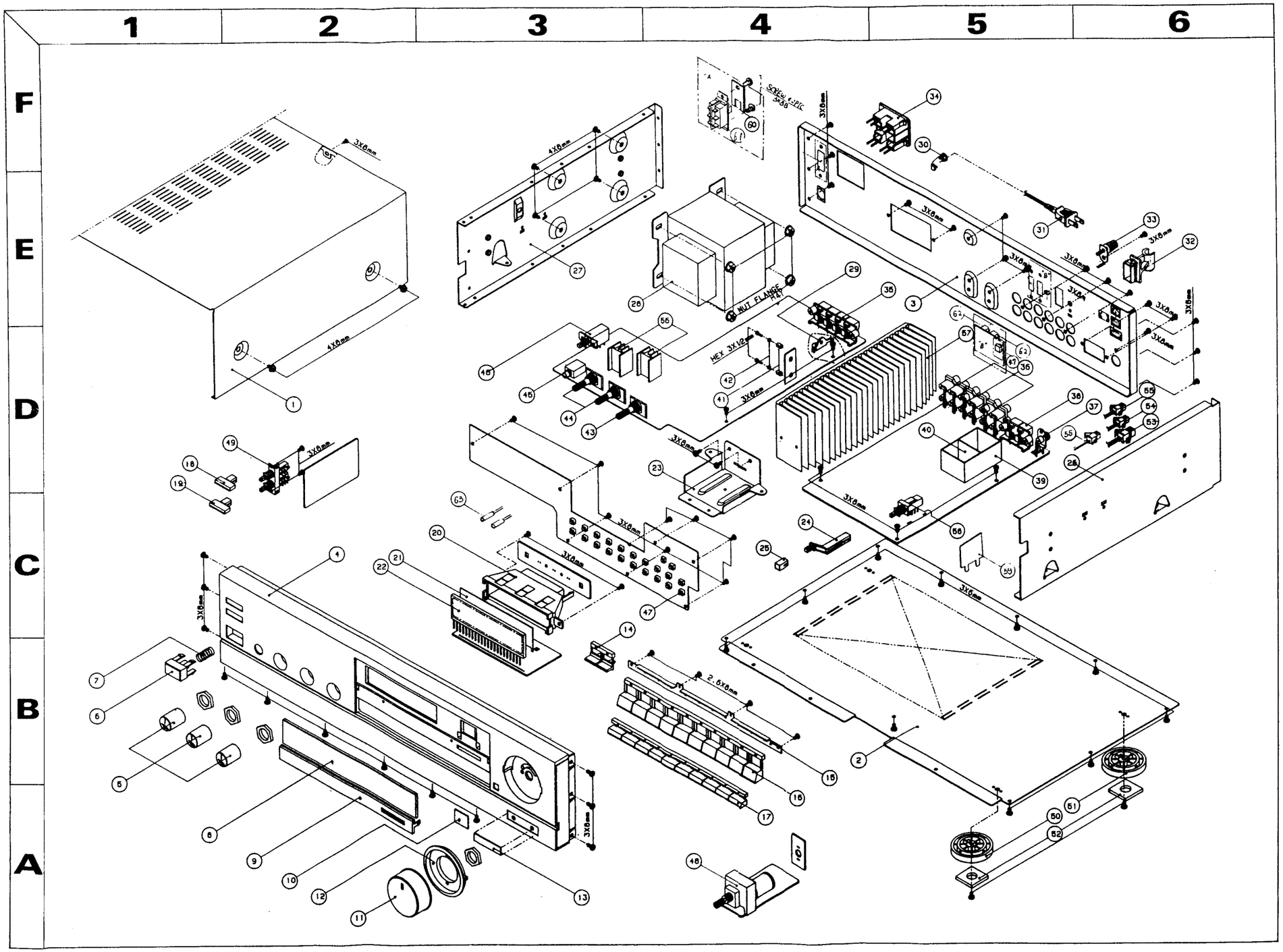


Point to Point Wiring Diagram



	B Version	C.D.F. Version	E Version
Connection of Primary	WHITE, YELLOW, RED, BLUE, ORANGE, BLACK — AC120V/220V/60Hz — 120V ⟷ 220V	YELLOW, BLACK — 220V/50Hz	WHITE, BLACK — 240V/50Hz

Exploded View of Cabinet & Chassis



Electrical Parts List

Ref. No	Part No.	Description	Position	Remark
Main Board 4002018500				
• Capacitors				
C201	3609334120	Mylar 0.33μF 100V	2B	
C202	3609334120	Mylar 0.33μF 100V	2C	
C203	3419547295	Electric 4700μF 50V	2B	
C204	3419547295	Electric 4700μF 50V	2A	
C205	3409210241	Electric 1000μF 25V	2D	
C206	3409210241	Electric 1000μF 25V	2D	
C207	3679153120	Mylar 0.015μF 100V	2D	
C208	3679153120	Mylar 0.015μF 100V	2D	
C209	3679823120	Mylar 0.082μF 100V	2D	
C210	3679823120	Mylar 0.082μF 100V	2D	
C211	3679352120	Mylar 0.0035μF 100V	2D	
C212	3679352120	Mylar 0.0035μF 100V	2D	
C213	3679183120	Mylar 0.018μF 100V	2D	
C214	3679183120	Mylar 0.018μF 100V	2D	
C215	3579471130	Ceramic 470pF 50V	1D	
C216	3579471130	Ceramic 470pF 50V	1D	
C217	3479210061	Electric 10μF 35V	2C	
C218	3479210061	Electric 10μF 35V	2C	
C219	3479210061	Electric 10μF 35V	2C	
C220	3479210971	Electric 1μF 50V	1C	
C221	3479210971	Electric 1μF 50V	1C	
C222	3479210121	Electric 100μF 10V	1D	
C223	3479247031	Electric 4.7μF 16V	2D	
C224	3479247031	Electric 4.7μF 16V	2D	
C225	3479247971	Electric 47μF 50V	1D	
C226	3579101130	Ceramic 100pF 50V	1D	
C227	3479247971	Electric 4.7μF 50V	2D	
C228	3479247971	Electric 4.7μF 50V	2D	
C229	3479247971	Electric 4.7μF 50V	1D	
C230	3579101130	Ceramic 100pF 50V	1D	
C231	3479247971	Electric 4.7μF 50V	1D	
C232	3479247971	Electric 4.7μF 50V	1D	
C233	3579470130	Ceramic 47pF 50V	1D	
C234	3579470130	Ceramic 47pF 50V	1D	
C235	3479247971	Electric 4.7μF 50V	2C	
C236	3479247031	Electric 47μF 50V	2C	
C237	3579101130	Ceramic 100pF 50V	2C	
C238	3579271130	Ceramic 270pF 50V	2C	
C239	3579121130	Ceramic 120pF 50V	2C	
C240	3479247871	Electric 0.47μF 50V	1C	
C241	3579473530	Ceramic 0.047μF 50V	1C	
C242	3579473530	Ceramic 0.047μF 50V	1C	
C243	3579220130	Ceramic 22pF 50V	1C	
C244	3479222071	Electric 22μF 50V	1C	
C245	3579220130	Ceramic 22pF 50V	1B	
C246	3479247971	Electric 4.7μF 50V	2A	
C247	3479247031	Electric 47μF 50V	2A	
C248	3579101130	Ceramic 100pF 50V	2A	
C249	3579271130	Ceramic 270pF 50V	2A	
C250	3579121130	Ceramic 120pF 50V	1A	
C251	3579473530	Ceramic 0.047μF 50V	1A	
C252	3579473530	Ceramic 0.047μF 50V	1A	
C253	3579220130	Ceramic 22pF 50V	1A	
C254	3479247871	Electric 0.47μF 50V	1A	
C255	3479222071	Electric 22μF 50V	1A	
C256	3579220130	Ceramic 22pF 50V	2A	
C288	3479222071	Electric 22μF 50V	1B	

Ref. No	Part No.	Description	Position	Remark
C289	3479222071	Electric 22μF 50V	1B	
C290	3479247061	Electric 47μF 35V	2B	
• Connectors				
CNT101	4435029430	Ass'y 3P 430mm	1D	
CNT201	4358102264	Ass'y MO5264-5395	3D	
CNT202	4358502160	Ass'y 2P 160mm	1D	
CNT202	4428505710	Plug 3P	1D	
CNT404	4428505710	Plug 3P	1D	
CNT501	4428505710	Plug 3P	1C	
CNT502	4428505710	Plug 3P	1A	
CNT601	4428508210	Plug 2P	1D	
CNT801	4428505710	Plug 3P	3D	
CNT901	4428505710	Plug 3P	2D	
• Diodes				
D201 ⚠	2058100105	1N5402	2B	
D202 ⚠	2058100105	1N5402	2B	
D203 ⚠	2058100105	1N5402	2B	
D204 ⚠	2058100105	1N5402	2C	
D205 ⚠	2058106100	1N4002	3C	
D206 ⚠	2058106100	1N4002	3C	
D207 ⚠	2058106100	1N4002	2C	
D208 ⚠	2058106100	1N4002	2C	
D209 ⚠	2058106100	1N4002	2C	
D210 ⚠	2058106100	1N4002	2C	
D211 ⚠	2058599107	DZ9.1V Zener	2C	
D212 ⚠	2058306101	1N4148	2C	
D213 ⚠	2058306101	1N4148	2C	
D214 ⚠	2058599109	DZ15V Zener	2C	
D215 ⚠	2058306101	1N4148	1C	
D216 ⚠	2058306101	1N4148	1C	
D217 ⚠	2058599104	DZ5.6V Zener	1D	
D218 ⚠	2058306101	1N4148	1C	
D219 ⚠	2058306101	1N4148	1C	
D220 ⚠	2058306101	1N4148	1A	
D221 ⚠	2058306101	1N4148	1A	
D222 ⚠	2058599115	DZ27V Zener	2B	
D223 ⚠	2058106100	1N4002	1A	
D224 ⚠	2058106100	1N4002	1A	
D225 ⚠	2058106100	1N4002	1C	
D226 ⚠	2058106100	1N4002	1C	
• Fuses				
F201 ⚠	5508212930	NB 31.8mm 4A 250Vac	3C	Domestic
⚠	5508212931	NB 31.8mm 4A 250Vac	3C	A
⚠	5508302535	NB 20.0mm 2.5A 250Vac	3C	B,C,D,E,F
F202 ⚠	5508212530	NB 31.8mm 2.5A 250Vac	3C	Domestic
⚠	5508212531	NB 31.8mm 2.5A 250Vac	3C	B
F203 ⚠	5508212030	NB 31.8mm 1A 250Vac	3C	Domestic
⚠	5508212031	NB 31.8mm 1A 250Vac	3C	A
⚠	5508302035	NB 20.0mm 1A 250Vac	3C	B,C,D,E,F
F204 ⚠	5508212030	NB 31.8mm 1A 250Vac	3C	Domestic
⚠	5508212031	NB 31.8mm 1A 250Vac	3C	A
⚠	5508302035	NB 20.0mm 1A 250Vac	3C	B,C,D,E,F
F205 ⚠	5508213030	NB 31.8mm 5A 250Vac	1BC	Domestic
⚠	5508213031	NB 31.8mm 5A 250Vac	1BC	A
⚠	5508403035	NB 20.0mm 5A 250Vac	1BC	B,C,D,E,F
F206 ⚠	5508213030	NB 31.8mm 5A 250Vac	1AB	Domestic
⚠	5508213031	NB 31.8mm 5A 250Vac	1AB	A

Ref. No	Part No.	Description	Position	Remark
F206 ⚠	5508403035	NB 20.0mm 5A 250Vac	1AB	B,C,D,E,F
• ICs				
IC201 ⚠	2168609102	MC7912CT, Regulator	3D	
IC202 ⚠	2168613107	UA7915UC, Regulator	2D	
IC203 ⚠	2168611100	NJM4560D, Dual OP Amp	1D	
• Resistors				
R201	3039330472	Metal Oxide 33 1W	3C	
R202 ⚠	3039100472	Metal Oxide 10 1W	3C	
R203 ⚠	3039100472	Metal Oxide 10 1W	3C	
R204 ⚠	3039100472	Metal Oxide 10 1W	2C	
R205	3069223970	Carbon Film 22k 1/5W	2D	
R206	3069223970	Carbon Film 22k 1/5W	2D	
R207	3069392970	Carbon Film 3.9k 1/5W	2D	
R208	3069392970	Carbon Film 3.9k 1/5W	2D	
R209	3069222970	Carbon Film 2.2k 1/5W	2D	
R210	3069222970	Carbon Film 2.2k 1/5W	2D	
R211	3069561970	Carbon Film 560 1/5W	2D	
R212	3069561970	Carbon Film 560 1/5W	2D	
R213	3069104970	Carbon Film 100k 1/5W	1D	
R214	3069104970	Carbon Film 100k 1/5W	1D	
R215	3069332970	Carbon Film 3.3k 1/5W	2C	
R216	3069823970	Carbon Film 82k 1/5W	2C	
R217	3069470970	Carbon Film 47 1/5W	2C	
R218	3069103970	Carbon Film 10k 1/5W	2C	
R219	3069103970	Carbon Film 10k 1/5W	2C	
R220	3069105970	Carbon Film 1M 1/5W	2C	
R221	3069102970	Carbon Film 1k 1/5W	2C	
R222	3069102970	Carbon Film 1k 1/5W	1C	
R223	3069102970	Carbon Film 1k 1/5W	1C	
R224	3069473970	Carbon Film 47k 1/5W	1C	
R225	3069101970	Carbon Film 100 1/5W	1C	
R226 ⚠	3039680472	Metal Oxide 68 1W	1D	
R227 ⚠	3009101273	Metal Oxide 100 1/4W	1D	
R228 ⚠	3009101273	Metal Oxide 100 1/4W	1D	
R229	3069623970	Carbon Film 62k 1/5W	2D	
R230	3069154970	Carbon Film 150k 1/5W	1D	
R231	3069102970	Carbon Film 1k 1/5W	2D	
R232	3069105970	Carbon Film 1M 1/5W	2D	
R233	3069562970	Carbon Film 5.6k 1/5W	2D	
R234	3069102970	Carbon Film 1k 1/5W	1D	
R235	3069154970	Carbon Film 150k 1/5W	1D	
R236	3069623970	Carbon Film 62k 1/5W	1D	
R237	3069105970	Carbon Film 1M 1/5W	1D	
R238	3069562970	Carbon Film 5.6k 1/5W	1D	
R239	3069102970	Carbon Film 1k 1/5W	2C	
R240	3069102970	Carbon Film 1k 1/5W	1C	
R241	3069473970	Carbon Film 47k 1/5W	2C	
R242	3069561970	Carbon Film 560 1/5W	1C	
R242	3069153970	Carbon Film 15k 1/5W	1C	next to C243
R243	3069223970	Carbon Film 22k 1/5W	1C	
R244	3069122970	Carbon Film 1.2k 1/5W	1C	
R245	3069152970	Carbon Film 1.5k 1/5W	1C	
R246	3069621970	Carbon Film 620 1/5W	1C	
R247 ⚠	3009271973	Carbon Film 270 1/5W	1C	
R248	3069272970	Carbon Film 2.7k 1/5W	1C	
R249	3069472970	Carbon Film 4.7k 1/5W	1C	
R250	3069153970	Carbon Film 15k 1/5W	1C	
R251	3069100970	Carbon Film 10 1/5W	1B	
R252	3069222970	Carbon Film 2.2k 1/5W	1B	

Ref. No	Part No.	Description	Position	Remark
R523	3059278682	Cement 0.27 3W	1C	
R254	3059278682	Cement 0.27 3W	1C	
R255	3009473373	Carbon Film 47k 1/2W	2B	
R256	3069223970	Carbon Film 22k 1/5W	2A	
R257	3069122970	Carbon Film 1.2k 1/5W	1A	
R258	3069152970	Carbon Film 1.5k 1/5W	1A	
R259	3069621970	Carbon Film 620 1/5W	1A	
R260	3069561970	Carbon Film 560 1/5W	1A	
R261	3069153970	Carbon Film 15k 1/5W	1A	
R262	3069153970	Carbon Film 15k 1/5W	1A	
R263	3009271973	Carbon Film 270 1/5W	1A	
R264	3069222970	Carbon Film 2.2k 1/5W	1B	
R265	3069100970	Carbon Film 10 1/5W	1B	
R266	3069472970	Carbon Film 4.7k 1/5W	1A	
R267	3069272970	Carbon Film 2.7k 1/5W	1A	
R268 ⚠	3059278682	Cement 0.27 3W	1A	
R269 ⚠	3059278682	Cement 0.27 3W	1A	
R288	3069103970	Carbon Film 10k 1/5W	1B	
• Transistors				
Q201	2208203105	PNP KTA 1015	2C	
Q202	2008610102	NPN 2SD 1302	1C	
Q203	2008210102	NPN 2SD 1302	1C	
Q204	2208206105	PNP KTA 1015	1C	
Q205	2008015700	PNP 2SA 798G	1C	
Q206	2028406120	NPN KTC 2235	1C	
Q207	2008609101	NPN MPSA05	1C	
Q208	2008606107	NPN KTC 2229	1B	
Q209	2028106107	PNP KTA 965Y	1B	
Q210	2028116104	PNP 2SA 1490	1B	
Q211	2028416107	NPN 2SC 3854	1C	
Q212	2008105700	PNP 2SA 798G	1A	
Q213	2028406120	NPN KTC 2235	1A	
Q214	2008609101	NPN MPSA05	1A	
Q215	2008606107	NPN KTC 2229	1A	
Q216	2028106107	PNP KTA 965Y	1B	
Q217	2028116104	PNP 2SA 1490	1B	
Q218	2028416107	NPN 2SC 3854	1A	
Q219	2008609101	NPN MPSA05	1B	

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• Capacitors						
C1	3529509210	Ceramic CH	5pF	50V	1A	D
C2	3529220210	Ceramic CH	22pF	50V	1A	D
C3	3509101130	Ceramic	100pF	50V	1A	
C4	3579102530	Ceramic	1000pF	50V	1A	
C5	3529220210	Ceramic CH	22pF	50V	1A	D
C6	3579103530	Ceramic	0.01μF	50V	1A	
C7	3579103530	Ceramic	0.01μF	50V	1A	
C8	3529809210	Ceramic CH	8pF	50V	1A	Except D
C9	3529220210	Ceramic CH	22pF	50V	1A	D
C10	3529809210	Ceramic CH	8pF	50V	1A	D
C11	3509101130	Ceramic	100pF	50V	1A	
C12	3579103530	Ceramic	0.01μF	50V	1B	
C13	3579203530	Ceramic	0.02μF	50V	1A	
C14	3579473530	Ceramic	0.047μF	50V	1B	
C15	3529209210	Ceramic CH	2pF	50V	1B	
C15	3529309530	Ceramic	3pF	50V	1B	D
C16	3529330210	Ceramic CH	33pF	50V	1B	
C17	3579103230	Ceramic	0.01μF	50V	1B	

Ref. No	Part No.	Description	Position	Remark
C18	3529150110	Ceramic RH 15pF 50V	1B	
C19	3529809110	Ceramic RH 8pF 50V	1B	
C20	3529809110	Ceramic RH 8pF 50V	1B	
C20	3529509110	Ceramic RH 5pF 50V	1B	D
C21	3529109210	Ceramic CH 1pF 50V	1B	
C22	3529209210	Ceramic CH 2pF 50V	1B	
C23	3579103530	Ceramic 0.01μF 50V	1B	
C24	3579103530	Ceramic 0.01μF 50V	1B	
C101	3409222131	Electric 220μF 16V	2B	
C102	3579203530	Ceramic 0.02μF 50V	2B	
C103	3579473530	Ceramic 0.047μF 50V	2B	
C104	3579203530	Ceramic 0.02μF 50V	2B	
C105	3579203530	Ceramic 0.02μF 50V	2B	
C106	3479210061	Electric 10μF 35V	2B	
C107	3579203530	Ceramic 0.02μF 50V	2B	
C108	3579820130	Ceramic 82pF 50V	2C	D
C109	3479210971	Electric 1μF 50V	2C	
C110	3579121130	Ceramic 120pF 50V	2C	D
C111	3579151130	Ceramic 150pF 50V	2C	D
C112	3679332120	Mylar 0.0033μF 100V	2C	
C113	3679332120	Mylar 0.0033μF 100V	2C	
C114	3679223120	Mylar 0.022μF 100V	1C	
C115	3479247971	Electric 4.7μF 50V	1C	
C116	3479210071	Electric 10μF 50V	1C	
C117	3479210971	Electric 1μF 50V	1B	
C118	3579470130	Ceramic 47pF 50V	1B	
C119	3479210061	Electric 10μF 35V	1B	
C120	3579106530	Ceramic 0.01μF 50V	1B	
C121	3619471110	Poly 470pF 50V	1B	
C122	•	Not used!		
C123	3579103530	Ceramic 0.01μF 50V	2B	
C124	3579103530	Ceramic 0.01μF 50V	2B	
C125	3579103530	Ceramic 0.01μF 50V	1B	
C126	•	Not used!		
C127	3479222971	Electric 2.2μF 50V	3B	
C128	3479222071	Electric 22μF 50V	3B	
C129	3479222071	Electric 22μF 50V	3B	
C130	3679152120	Mylar 0.0015μ 100V	3B	
C130	3679102120	Mylar 0.001μF 100V	3B	B,C,D,E,F
C131	3679152120	Mylar 0.0015μF 100V	3B	
C131	3679102120	Mylar 0.001μF 100V	3B	B,C,D,E,F
C132	3479233971	Electric 3.3μF 50V	3C	
C133	3479210971	Electric 1μF 50V	3C	
C134	3479233971	Electric 3.3μF 50V	3C	
C135	3479210971	Electric 1μF 50V	3C	
C136	3619102110	Poly 100pF 50V	3C	
C137	3679473120	Mylar 0.047μF 100V	3C	
C138	3619681110	Poly 680pF 50V	3C	
C143	3479210971	Electric 1μF 50V	3C	
C144	•	Not used!		
C145	3479210971	Electric 1μF 50V	2C	
C146	•	Not used!		
C147	3579101130	Ceramic 100pF 50V	1C	
C148	3579101130	Ceramic 100pF 50V	1C	
C149	3479247031	Electric 47μF 16V	1C	
C150	3529180210	Ceramic CH 18pF 50V	1C	
C151	3529180210	Ceramic CH 18pF 50V	1C	
C152	3479210971	Electric 1μF 50V	1C	
C153	3649472120	Ceramic 0.0047μF 50V	1C	
C154	•	Not used!		
C155	3579103530	Ceramic 0.01μF 50V	1C	

Ref. No	Part No.	Description	Position	Remark
C156	3479210061	Electric 10μF 35V	1C	
C157	3479247971	Electric 4.7μF 50V	2B	
C158	3479210971	Electric 1μF 50V	1B	
C159	3479103530	Ceramic 0.01μF 50V	1C	
C203	3579101130	Ceramic 100pF 50V	3A	
C204	3579101130	Ceramic 100pF 50V	3A	
C205	3579101130	Ceramic 100pF 50V	3A	
C206	3579101130	Ceramic 100pF 50V	3A	
C207	3579101130	Ceramic 100pF 50V	3A	
C208	3579101130	Ceramic 100pF 50V	2A	
C209	3579101130	Ceramic 100pF 50V	2A	
C210	3579101130	Ceramic 100pF 50V	2A	
C211	3479210971	Electric 1μF 50V	3A	
C212	3479247139	Electric 470μF 16V	2B	
C213	3479247031	Electric 47μF 16V	2B	
C214	3509181130	Ceramic 180pF 50V	2C	
C215	3679563120	Mylar 0.056μF 100V	2C	
C216	3679563120	Mylar 0.056μF 100V	2C	
C217	3509181130	Ceramic 180pF 50V	2C	
C901	3579101130	Ceramic 100pF 50V	2A	
C901	3579680130	Ceramic 68pF 50V	2A	D
C902	3579101130	Ceramic 100pF 50V	2A	
C903	•	Not used!		
C904	3579101130	Ceramic 100pF 50V	2A	
C905	3479247971	Electric 4.7μF 50V	2A	
C906	•	Not used!		
C907	3679182120	Mylar 0.0018μF 100V	2A	
C908	3679562120	Mylar 0.0056μF 100V	2A	
C909	3479247871	Electric 0.47μF 50V	2A	
C910	3679562120	Mylar 0.0056μF 100V	2B	
C911	3479247031	Electric 47μF 16V	2B	
C912	•	Not used!		
C913	3579101130	Ceramic 100pF 50V	2A	
C914	3479247971	Electric 4.7μF 50V	2A	
C915	•	Not used!		
C916	3479247031	Electric 47μF 16V	2A	
C917	3479247031	Electric 47μF 16V	2A	
C918	3579222130	Ceramic 2200pF 50V	2A	
C919	3579101130	Ceramic 100pF 50V	2A	
C920	3679562120	Mylar 0.0056μF 100V	2B	
C921	3479247971	Electric 47μF 16V	2B	
C922	3679182120	Mylar 0.0018μF 100V	2A	
C923	3679562120	Mylar 0.0056μF 100V	2A	
C924	3479247871	Electric 0.47μF 50V	2A	
FC101	3579101130	Ceramic 100pF 50V	3A	D
FC102	3579101130	Ceramic 100pF 50V	3A	D
FC103	3579101130	Ceramic 100pF 50V	3A	D
FC104	3579101130	Ceramic 100pF 50V	3A	D
FC105	3579101130	Ceramic 100pF 50V	3A	D
FC106	3579101130	Ceramic 100pF 50V	3A	D
FC107	3579101130	Ceramic 100pF 50V	3A	D
FC108	3579101130	Ceramic 100pF 50V	2A	D
FC109	3579101130	Ceramic 100pF 50V	2A	D
FC110	3579101130	Ceramic 100pF 50V	2A	D
FC111	3579220130	Ceramic 22pF 50V	2A	D
FC112	3579220130	Ceramic 22pF 50V	2A	D
FR101	3579220130	Ceramic 22pF 50V	2A	D
FR102	3579220130	Ceramic 22pF 50V	2A	D
CF901	3579473530	Ceramic 0.047μF 50V	2A	D
X-TAL101	3908101030	HC-18/U 7.2MHz	1C	

Ref. No	Part No.	Description	Position	Remark
• Coils				
L1	2648001410	Spring FM ANT	1A	
L2	2648001400	Spring FM RF(B)	1A	A,B,C,E,F
L3	2648001290	FM RF(A)	1A	
L4	2648001280	FM RF(B)	1A	A,B,C,E,F
L4	2648001400	Spring FM RF(B)	1A	D
L5	2648001400	Spring FM RF(B)	1A	D
L6	2638001060	FM OSC	1B	
L7	2648601400	Inductor 22μH	1A	
TC1	3838001000	Ceramic Trimmer TZ03	1A	
TC2	3838001000	Ceramic Trimmer TZ03	1A	
TC3	3838001000	Ceramic Trimmer TZ03	1A	D
T101	2838001030	FM IFT	1B	
T102	2838501110	Quad Det(A)	2B	
T103	2838501210	Quad Det(B) FM TOK	2B	
T104	2638201150	AM OSC	2B	
T105	2608201120	AM ANT	1B	
T106	2848001250	AM IFT	1C	
7J3	2648601010	Inductor 2.2μH	1A	D
6J7	2648601010	Inductor 2.2mH	1B	D
•	2648601470	Inductor 50mH	2A	D next to
•	2648601470	Inductor 50mH	2A	D FC111.
L101F	2648601430	Inductor 20.8mH	2C	D
• Connectors				
CNT101	4428505710	Plug 3P	2B	
CNT102	4428508210	Plug 2P	1C	
CNT103	4428505610	Plug 4P	1C	
CNT104	4428517810	Plug 5P	2C	
CNT105	4358105106	A'ssy 5P	2C	
CNT106	4355029540	A'ssy 4P, 540mm	3C	
• Diodes				
D1	2058819107	Varactor KV1310A	1A,1B	
D2	2058819107	Varactor KV1310A	1A,1B	
D3	2058819107	Varactor KV1310A	1A,1B	
D4	2058819107	Varactor KV1310A	1A,1B	
D101 △	2058306101	1N 4148	2C,1C	
D102 △	2058306101	1N 4148	2C,1C	
D103 △	2058306101	1N 4148	2C,1C	
D104 △	2058306101	1N 4148	2C,1C	
D105 △	2058306101	1N 4148	2C,1C	
D106 △	2058599104	Zener DZ 5.6	3C	
D107 △	2058306101	1N 4148	3C	
D108 △	2058306101	1N 4148	3C	
D109 △	2058306101	1N 4148	3C	
D110 △	2058306101	1N 4148	3C	
D111 △	2058306101	1N 4148	3C	
D113 △	2058306101	1N 4148	2C	
D120 △	2058306101	1N 4148	3C	
D201 △	2058306101	1N 4148	3A	
• Filters				
CF101	3908011001	Ceramic SFE 10.7MA8-A	2B	A
CF101	3908011011	Ceramic SFE 10.7MS3GH	2B	B,C,D,E,F
CF102	3908011001	Ceramic SFE 10.7MA8-A	2B	A
CF102	3908011011	Ceramic SFE 10.7MS3GH	2B	B,C,D,E,F
CF103	3908011011	Ceramic SFE 10.7MS3GH	2B	D
CF104	3908001380	Ceramic STZ 450F	1C	
CF105	3908001020	BFU 450C 4N	1C	
B.P.F	3938001001	Resonator Ceramic CSB45	1A	
	3938001005	Resonator Ceramic PFW B4	1A	D
• ICs				
IC101	2168017132	LC 7821, Switching	2B	
IC102	2168017128	LA 1266, IF	2B	
IC103	2138017112	LM 7001, PLL IC	1C	
IC104	2168411105	HA 12016, FM MPX	3C	
IC901	2168220104	NJM 4558D, Dual OP Amp	2A	
• Resistors				
R1	3069105970	Carbon Film 1M 1/5W	1A	
R2	3069104970	Carbon Film 100k 1/5W	1A	
R3	3069104970	Carbon Film 100k 1/5W	1A	
R4	3069473970	Carbon Film 47k 1/5W	1A	
R5	3069561970	Carbon Film 56 1/5W	1A	
R6	3069333970	Carbon Film 33k 1/5W	1A	
R7	3069101970	Carbon Film 100 1/5W	1A	
R8	3069333970	Carbon Film 33k 1/5W	1A	D
R9	3069333970	Carbon Film 33k 1/5W	1A	D
R10	3069272970	Carbon Film 2.7k 1/5W	1A	
R10	3069202970	Carbon Film 2k 1/5W	1A	D
R11	3069471970	Carbon Film 470 1/5W	1A	
R12	3069273970	Carbon Film 27k 1/5W	1A	
R13	3069561970	Carbon Film 560 1/5W	1A	
R14	3069181970	Carbon Film 180 1/5W	1A	
R15	3069332970	Carbon Film 3.3k 1/5W	1B	
R16	3069101970	Carbon Film 100 1/5W	1B	
R17	3069103970	Carbon Film 10k 1/5W	1B	
R18	3069333970	Carbon Film 33k 1/5W	1B	
R19	3069822970	Carbon Film 8.2k 1/5W	1B	
R20	3069561970	Carbon Film 560 1/5W	1B	
R21	3069473970	Carbon Film 47k 1/5W	1B	
R22	3069474970	Carbon Film 470k 1/5W	1B	
R23	3069101970	Carbon Film 100 1/5W	1B	
R24	3069181970	Carbon Film 180 1/5W	1A	
R101	3069101970	Carbon Film 100 1/5W	2B	
R102	3069561970	Carbon Film 560 1/5W	2B	
R103	3069471970	Carbon Film 470 1/5W	2B	
R104	3069333970	Carbon Film 33k 1/5W	2B	
R105	3069331970	Carbon Film 330 1/5W	2B	
R107	3069332970	Carbon Film 3.3k 1/5W	2B	
R108	3069103970	Carbon Film 10k 1/5W	2B	
R109	3069103970	Carbon Film 10k 1/5W	2B	
R110	3069103970	Carbon Film 10k 1/5W	2C	A
R110	3069473970	Carbon Film 47k 1/5W	2C	B,C,D,E,F
R111	3069103970	Carbon Film 10k 1/5W	2C	
R112	3069103970	Carbon Film 10k 1/5W	1C	
R113	3069222970	Carbon Film 2.2k 1/5W	1C	
R114	3069104970	Carbon Film 100k 1/5W	1C	
R115	•	Not used!		
R116	3069220970	Carbon Film 22 1/5W	1C	
R117	3069223970	Carbon Film 22k 1/5W	1B	
R118	3069681970	Carbon Film 680 1/5W	1C	
R121	3069560970	Carbon Film 56 1/5W	3C	
R122	3069753970	Carbon Film 75k 1/5W	2C	
R123	3069562970	Carbon Film 5.6k 1/5W	3C	

Ref. No	Part No.	Description	Position	Remark
R124	3069102970	Carbon Film 1k 1/5W	3C	
R125	3069332970	Carbon Film 3.3k 1/5W	3C	
R126	3069223970	Carbon Film 22k 1/5W	3B	
R127	3069223970	Carbon Film 22k 1/5W	3B	
R128	3069332970	Carbon Film 3.3k 1/5W	3B	
R129	3069473970	Carbon Film 47k 1/5W	3B	
R130	3069392970	Carbon Film 3.9k 1/5W	3B	
R131	3069332970	Carbon Film 3.3k 1/5W	3B	
R132	3069473970	Carbon Film 47k 1/5W	3B	
R133	3069332970	Carbon Film 3.3k 1/5W	3B	
R134	3069332970	Carbon Film 3.3k 1/5W	3B	
R135	3069332970	Carbon Film 3.3k 1/5W	3B	
R136	3069332970	Carbon Film 3.3k 1/5W	3B	
R137	3069332970	Carbon Film 3.3k 1/5W	3B	
R138	3069104970	Carbon Film 100k 1/5W	3C	
R139	3069103970	Carbon Film 10k 1/5W	3C	
R140	3069563970	Carbon Film 56k 1/5W	3C	
R141	3069332970	Carbon Film 3.3k 1/5W	3C	
R142	3069332970	Carbon Film 3.3k 1/5W	3C	
R143	3069473970	Carbon Film 47k 1/5W	3C	
R144	3069103970	Carbon Film 10k 1/5W	3C	
R145	3069473970	Carbon Film 47k 1/5W	3C	
R146	3069103970	Carbon Film 10k 1/5W	3C	
R147	3069473970	Carbon Film 47k 1/5W	2C,3C	
R148	3069473970	Carbon Film 47k 1/5W	2C,3C	
R149	3069223970	Carbon Film 22k 1/5W	2C	
R150	3069223970	Carbon Film 22k 1/5W	3C	
R151	3069560970	Carbon Film 56 1/5W	2C	
R152	3069103970	Carbon Film 10k 1/5W	3C	
R153	3069472970	Carbon Film 4.7k 1/5W	2C	
R154	3069103970	Carbon Film 10k 1/5W	2C	
R157	3069103970	Carbon Film 10k 1/5W	3C	
R158	3069103970	Carbon Film 10k 1/5W	3C	
R159	3069332970	Carbon Film 3.3k 1/5W	3C	
R162	3069223970	Carbon Film 22k 1/5W	2C	
R163 △	3009560273	Carbon Film 56 1/5W	1C	
R164	3069750970	Carbon Film 75 1/5W	1C	
R165	3069102970	Carbon Film 1k 1/5W	1C	
R166	3069102970	Carbon Film 1k 1/5W	1C	
R167	3069101970	Carbon Film 100 1/5W	1C	
R168	3069101970	Carbon Film 100 1/5W	1C	
R169	3069103970	Carbon Film 10k 1/5W	1C	
R170	3069103970	Carbon Film 10k 1/5W	1C	
R171	3069103970	Carbon Film 10k 1/5W	1C	
R172	3069103970	Carbon Film 10k 1/5W	1C	
R173	3069103970	Carbon Film 10k 1/5W	1B	
R174	3069103970	Carbon Film 10k 1/5W	1B	
R175	3069101970	Carbon Film 100 1/5W	1C	
R176	3069103970	Carbon Film 10k 1/5W	1C	
R177	3069101970	Carbon Film 100 1/5W	1C	
R178	3069472970	Carbon Film 4.7k 1/5W	1B	
R179	3069223970	Carbon Film 22k 1/5W	2C	
R201	3069102970	Carbon Film 1k 1/5W	3A	
R202	3069102970	Carbon Film 1k 1/5W	3A	
R203	3069102970	Carbon Film 1k 1/5W	3A	
R204	3069102970	Carbon Film 1k 1/5W	3A	
R205	3069102970	Carbon Film 1k 1/5W	3A	
R206	3069102970	Carbon Film 1k 1/5W	3A	
R207	3069102970	Carbon Film 1k 1/5W	3A	
R208	3069102970	Carbon Film 1k 1/5W	2A	

Ref. No	Part No.	Description	Position	Remark
R209	3069102970	Carbon Film 1k 1/5W	2A	
R210	3069102970	Carbon Film 1k 1/5W	2A	
R211	3069104970	Carbon Film 100k 1/5W	3A	
R212 △	3069101970	Carbon Film 100 1/5W	3B	
R213 △	3069101970	Carbon Film 100 1/5W	3B	
R214	3069183970	Carbon Film 18k 1/5W	2C	
R215	3069562970	Carbon Film 5.6k 1/5W	2C	
R216	3069562970	Carbon Film 5.6k 1/5W	2C	
R217	3069183970	Carbon Film 18k 1/5W	2C	
R901 △	3009101273	Carbon Film 100 1/5W	2C	
R902 △	3009101273	Carbon Film 100 1/5W	2A	
R903	3069102970	Carbon Film 1k 1/5W	2A	
R904	3069103970	Carbon Film 10k 1/5W	2A	
R905	3069102970	Carbon Film 1k 1/5W	2A	
R906	3069103970	Carbon Film 10k 1/5W	2A	
R907	3069104970	Carbon Film 100k 1/5W	2A	
R908	3069911970	Carbon Film 910 1/5W	2A	
R909	3069432970	Carbon Film 4.3k 1/5W	2A	
R910	3069564970	Carbon Film 560k 1/5W	2A	
R911	3069471970	Carbon Film 470 1/5W	2B	
R912	3069104970	Carbon Film 100k 1/5W	2A	
R914	3069911970	Carbon Film 910 1/5W	2A	
R915	3069433970	Carbon Film 43k 1/5W	2A	
R916	3069564970	Carbon Film 560k 1/5W	2A	
R917	3069471970	Carbon Film 470 1/5W	2B	next to C913
R917	3069104970	Carbon Film 100k 1/5W	2A	
R918	3069104970	Carbon Film 100k 1/5W	2A	
• Semi.Resistors				
VR101	3248333320	NVR 83 HOz 33KB	1C	
VR102	3248333320	NVR 83 HOz 33KB	1C	
VR103	3248333220	NVR 83 HOz 3.3KB	3C	
VR104	3248347420	NVR 83 HOz 470KB	3B	
• Transistors/FETs				
Q1	2018213100	FET 3SK74L	1A	
Q2	2008406103	NPN KTC 1923Y	1A	
Q3	2008406103	NPN KTC 1923Y	1B	
Q4	2018206110	KTK 161Y	1B	
Q5	2008406103	NPN KTC 1923Y	1B	
Q88	2208606104	NPN KTC 1815Y	3C	
Q89	2208606104	NPN KTC 1815Y	3C	
Q101	2008409101	LM 9018F	2B	
Q102	2208606104	NPN KTC 1815Y	3B	
Q103	2208606104	NPN KTC 1815Y	3B	
Q104	2208206105	PNP KTA 1015Y	3C	
Q105	2208606104	NPN KTC 1815Y	3C	
Q106	2208606104	NPN KTC 1815Y	3C	
Q107	2208606104	NPN KTC 1815Y	3C	
Q108	2208206105	PNP KTA 1015Y	3C	
Q109	2208606104	NPN KTC 1815Y	2C	
Q110	2208606108	NPN KTC 2240BL	1C	
Q111	2018211100	2SK 168D	1C	
Q112	2208206105	PNP KTA 1015Y	1C	
Q113	2208206105	PNP KTA 1015Y	1C	

CPU Board 4002018510

Ref. No	Part No.	Description	Position	Remark
• Capacitors				
C401	3579330130	Ceramic 33pF 50V	A	

Ref. No	Part No.	Description	Position	Remark
C402	3579330130	Ceramic 33pF 50V	A	
C403	3479210971	Electric 1μF 50V	A	
C404	3479210061	Electric 10μF 35V	A	
C405	3479210121	Electric 100μF 10V	B	
CB401	3439110412	CAP AC206G 104Z	B	
X-TAL401	3908101150	X-TAL 6MHz	A	
• Connectors				
CNT103	4355029540	Ass'y 4P 540mm	A	
CNT104	4358505300	Ass'y GS G-J 05 30D	A	
CNT401	4358104403	Ass'y 4P 400mm	B	B
CNT402	4358205502	Ass'y 5P 500mm	A	Domestic
CNT403	4358107140	Ass'y 5395-07-140DL 140mm	B	
CNT404	4358103202	Ass'y 3P 200mm	A	
CNT405	4358202700	Ass'y 2P	A	
CNT406	4358203700	Ass'y 3P	A	
CNT407	4358102350	Ass'y 2P	A	
CNT408	4358202350	Ass'y 2P	D	
• Diodes				
D401 △	2058306101	1N 4148	B	
D402 △	2058306101	1N 4148	D	
• ICs				
IC401	2138399102	CPU MB88514BP-1069	A	
IC402	2138099103	JMM-001, Remocon Sensor	D	
• Resistors				
R401	3069392970	Carbon Film 3.9k 1/5W	B	
R402	3069392970	Carbon Film 3.9k 1/5W	B	
R403	3069392970	Carbon Film 3.9k 1/5W	B	
R404	3069392970	Carbon Film 3.9k 1/5W	B	
R405	3069392970	Carbon Film 3.9k 1/5W	B	
R406	3069392970	Carbon Film 3.9k 1/5W	B	
R407	3069392970	Carbon Film 3.9k 1/5W	B	
R408	3069392970	Carbon Film 3.9k 1/5W	B	
R409	3069392970	Carbon Film 3.9k 1/5W	B	
R410	3069473970	Carbon Film 47k 1/5W	B	
R411	3069101970	Carbon Film 100 1/5W	A	
R412	3069473970	Carbon Film 47k 1/5W	A	
R413	3069101970	Carbon Film 100 1/5W	A	
R414	3069473970	Carbon Film 47k 1/5W	A	
R415	3069101970	Carbon Film 100 1/5W	A	
R416	3069102970	Carbon Film 1k 1/5W	A	
R417	3069103970	Carbon Film 10k 1/5W	A	
R418	3069473970	Carbon Film 47k 1/5W	A	
R419	3069473970	Carbon Film 47k 1/5W	A	
R419	3069101970	Carbon Film 100 1/5W	B	next to CNT103
R420	3069473970	Carbon Film 47k 1/5W	A	
R421	3069101970	Carbon Film 100 1/5W	A	
R422	3069102970	Carbon Film 1k 1/5W	A	
R423	3069103970	Carbon Film 10k 1/5W	A	
R424	3069472970	Carbon Film 4.7k 1/5W	A	
R425	3069103970	Carbon Film 10k 1/5W	A	
R426	3069222970	Carbon Film 2.2k 1/5W	A	
R427	3069472970	Carbon Film 4.7k 1/5W	A	
R428	3069103970	Carbon Film 10k 1/5W	A	
R429	3069222970	Carbon Film 2.2k 1/5W	A	
R430	3069222970	Carbon Film 2.2k 1/5W	B	

Ref. No	Part No.	Description	Position	Remark
R431	3069222970	Carbon Film 2.2k 1/5W	B	
R432	3069222970	Carbon Film 2.2k 1/5W	B	
R433	3069331970	Carbon Film 330 1/5W	B	
R434	3069472970	Carbon Film 4.7k 1/5W	D	
R435	3069103970	Carbon Film 10k 1/5W	D	
R436	3069103970	Carbon Film 10k 1/5W	D	
R437	3069103970	Carbon Film 10k 1/5W	D	
R438	3069103970	Carbon Film 10k 1/5W	D	
R439	3069103970	Carbon Film 10k 1/5W	D	
R440	3069331970	Carbon Film 330 1/5W	D	
R441	3069103970	Carbon Film 10k 1/5W	D	
RN-401	3088473174	Network, 12P 47k 1/8W	A	
• Transistors				
Q401	2208606104	NPN KTC1815Y	A	
Q402	2208606104	NPN KTC1815Y	A	
Q403	2208606104	NPN KTC1815Y	A	
Q404	2208606104	NPN KTC1815Y	D	
Q405	2208606104	NPN KTC1815Y	D	
Q406	2208606104	NPN KTC1815Y	D	

LCD Board 4002018520

• Capacitors				
C701	3479210061	Electric 10μF 35V		
C702	3579681230	Ceramic 680pF 50V		
C703	3479210971	Electric 1μF 50V		
• Connectors				
CNT403	4428505410	Plug 7P		
• Resistors				
R701	3069101970	Carbon Film 100 1/5W		
R702	3069681970	Carbon Film 680 1/5W		
R703	3069122970	Carbon Film 1.2k 1/5W		
R704	3069473970	Carbon Film 47k 1/5W		

Regulator IC Board 4002018590

IC901	2168601105	IC, GD 7815		
CNT901	4358103166	Connector Ass'y MO-5264-03-16		

Volume Board 4002018540

• Capacitors				
C601	3479210121	Electric 100μF 10V		
C602	3409247121	Electric 470μF 10V		
C603	3409247121	Electric 470μF 10V		
• Connectors				
CNT105	4428505710	Plug 3P		
CNT202	4355030740	Ass'y 3P		
CNT407	4428508210	Plug 2P		
CNT601	4358102264	Ass'y MO 5264-0310		
• Diodes				
D601 △	2058599100	Zener DZ 3.3V		
D602 △	2058599100	Zener DZ 3.3V		
• IC				
IC601	2168220103	BA 6208		

Ref. No	Part No.	Description	Position	Remark
• Resistor				
R601 △	3069122970	Carbon Film 1.2k 1/5W		

Speaker Board 4002018530

• Capacitor				
C801	3679473120	Mylar 0.047μF 100V		
• Coils				
L801	2648001010	Inductor 0.5μH		
L802	2648001010	Inductor 0.5μH		
• Connector				
CNT801	4358103163	Ass'y 3P MO 5395-03-16		
• Resistors				
R801 △	3009339273	Metal Film 3.3 1/4W		
R802 △	3039100472	Metal Oxide 10 1W		
R803 △	3039271472	Metal Oxide 270 1W		
R804 △	3009339273	Metal Film 3.3 1/4W		
R805 △	3039100472	Metal Oxide 10 1W		
R806 △	3039271472	Metal Oxide 270 1W		

Biasing Board 4002018580

• Connectors				
CNT501	4358103105	Ass'y MO 5264-0310		
CNT502	4358103105	Ass'y MO 5264-0310		
• Transistors				
Q501	2008609107	MPS 9633C		
Q502	2008609107	MPS 9633C		

De-Amphasis Board 4002018550 ('B' Group Only)

• Capacitors				
C101	3579471130	Ceramic 470pF 50V	B	
C102	3579471130	Ceramic 470pF 50V	B	
• Connectors				
CNT106	4358104203	Ass'y 4P	B	
CNT401	4428505610	Plug 4P	B	
• Resistors				
R101	3069104970	Carbon Film 100k 1/5W	B	
R102	3069222970	Carbon Film 2.2k 1/5W	B	

Commander Board 4005010900

• Capacitors				
C801	3409247022	Electric Afss 47μF 10WV		
C802	3509101130	Ceramic 100pF 50V		
C803	3509101130	Ceramic 100pF 50V		
CS801	3938001001	Resonator Ceramic CSB 45		
• Diodes				
LD801	2408001100	EL2 KOEC		
LD802	2308060105	LED, KLR 226E RD		
• IC				
IC801	2138013122	UPD 6122G-002		

Ref. No	Part No.	Description	Position	Remark
• Resistors				
R801	3009102972	Carbon Film 1k 1/5W		
R802	3009229972	Carbon Film 2.2 1/5W		
R803	3009224972	Carbon Film 220k 1/5W		
R804	3009224972	Carbon Film 220k 1/5W		
R805	3009224972	Carbon Film 220k 1/5W		
• Transistors				
Q801	2008622100	2SC 2021R/S		
• Miscellaneous Parts				
•	2828065907	Power Transformer		A
•	2828066801	Power Transformer		B
•	2828066901	Power Transformer		C,D,F
•	2828067001	Power Transformer		E
•	2828067101	Power Transformer		Domestic

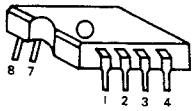
Mechanical Parts List

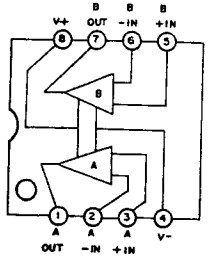
No.	Parts No.	Description	Q'ty	Position	Remark
1	046122018211	Cover-Top, Black	1	D2	
2	6122413910	Cover-Bottom	1	B4	
3	046102025111	Chassis-Back, Black	1	E5	Domestic
	046102025121	Chassis-Back, Black	1	E5	A
	046102025131	Chassis-Back, Black	1	E5	B
	046102025141	Chassis-Back, Black	1	E5	C
	046102025151	Chassis-Back, Black	1	E5	D
	046102025161	Chassis-Back, Black	1	E5	E
	046102025171	Chassis-Back, Black	1	E5	F
4	048501012111	Panel-Front, Black	1	C2	
5	8543015810	Knob Rotary (T.T.B)	1	B1	
6	048545048211	Button-Power, Black	1	B1	
7	6555004380	Button Spring	1	B1	
8	048553009311	Window LCD	1	A1	
9	048583002511	Cover-Front	1	A2	
10	8555018610	Window Remote	1	A2	
11	8543019510	Knob-Rotary, Main	1	A2	
	048643003611	Knob-Rotary, Main	1	A2	D
12	8523009210	Ring-Decoration	1	A2	
13	048535019011	Name Badge	1	A3	
14	8543019610	Button Tact	1	C3	
15	6503013410	Knob Bracket	1	B4	
16	8502000212	Button Tact, Long	1	A4	
17	8502000311	Button Tact, Short	1	A4	
18	048543019411	Knob Push, Main Speaker	1	D1	
19	048543019412	Knob Push, SUR.Speaker	1	D1	
20	6062100410	LCD Holder	1	C3	
21	048555024111	Filter LCD, Orange	1	C2	
22	2338001136	LCD Display	1	C2	
23	6503012310	Bracket Heatsink	1	D4	
24	6303001310	Shaft Knob, Long	1	C4	
25	8545049310	Knob Push, Loudness	1	C4	
26	6122618320	Frame Side, Right	1	D5	
27	6122618310	Frame Side, Left	1	E3	
28	2828065907	Power Transformer	1	E3	
29	6505088410	Bracket PCB (B)	1	E4	
30	6518000710	Stopper-AC Cord	1	F5	A,B
	6518000111	Stopper-AC Cord	1	F5	C,D,F
	6513000210	Stopper-AC Cord	1	F5	E
	6513000310	Stopper-AC Cord	1	F5	Domestic
31	4308001410	Cord-AC Power, Black	1	E5	A,B
	4308000430	Cord-AC Power, Black	1	E5	C,D,F
	4308000610	Cord-AC Power, Black	1	E5	E
	4308001610	Cord-AC Power, Black	1	E5	Domestic
32	6518001310	Holder Antenna	1	E6	
33	4408103710	Ground Screw, Black	1	E6	
34	4448100910	Outlet, 1P×2	1	F5	A,B
	4448100510	Outlet, 1P×2	1	F5	C,D,F
	•	Not used!	1	F5	E
	4448100410	Outlet, 1P×2	1	F5	Domestic
35	4408101360	Speaker Terminal	1	E5	
36	4438103110	RCA Jack	3	D5	
37	4355032110	Connector, FM	1	D5	A,B,Domestic
	4438301110	Connector, FM	1	D5	C,D,E,F
38	4408001310	Push Terminal Board, 2P	1	D5	
39	6163105610	Shield Fence (A)	1	D5	Except D
	6163107110	Shield Fence (A)	1	D5	D
40	6163105610	Shield Fence (A)	1	D5	A
	6125128510	Shield Fence (B)	2	D5	D
	6163105810	Shield Fence (D)	1	D5	D
	6165128610	Shield Fence (E)	1	D5	D

No.	Parts No.	Description	Q'ty	Position	Remark
41	7015003120	Bussing	2	D4	D
42	8319130011	Washer-Spring ø3 ZNY	2	D4	
43	3208054410	VR 100KSW, Balance	1	D3	
44	3208049910	VR 100KC×2, BASS TREBLE	1	D3	
45	4438003910	Jack Phone	1	D3	
46	4628044410	Switch-Push, Power	1	D3	
47	4658002020	Switch Tact	22	C3	B is 23pcs.
48	3208054310	VR Motor, for Remote	1	A4	
49	4628053610	Switch Push, 2 Key	1	D2	
50	046035101421	Foot, Gold	2	A5	
51	6035101420	Foot, Black	2	A5	
52	6725002110	Cushion-Foot, Black	4	A5	
53	4358203700	Ass'y Connector, 3P	1	D6	
54	4358202700	Ass'y Connector, 2P	1	D6	
55	4358202350	Ass'y Connector, 2P	1	D6	
56	7505201940	Regulator TR Heatsink	2	E4	
57	7503101210	Heatsink Power	1	E4	
58	4628044010	Switch Push 1 Key, Loudness	1	C5	
59	6105131810	Shield Fence	1	C5	
60	6515000630	Holder Voltage	1	F4	
61	4618000410	Slide Switch, Vtg.Selector	1	F4	
62	4618000610	De-Emphasis Switch	2	E4	
63	2528203810	Lamp, Amber	2	D3	

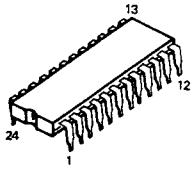
Semiconductor Lead Identification & Internal Diagram

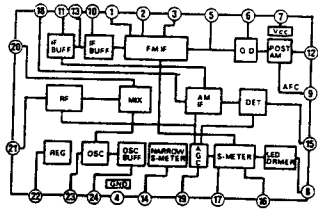
NJM46580:IC901/ NJM 4560D:IC 203(Dual OP Amp)



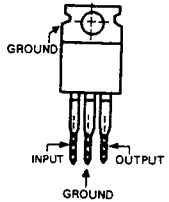


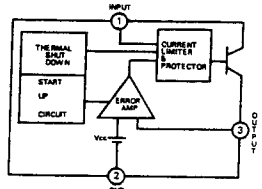
LA1266:IC102(IF)





GD 7815:IC901
(Regulator)





HA 12016:IC 104(MPX)